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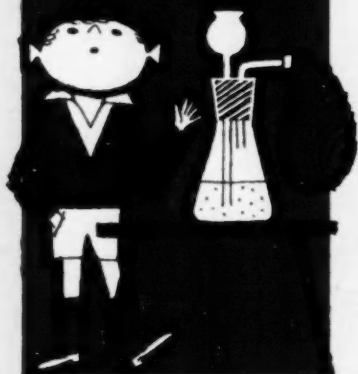
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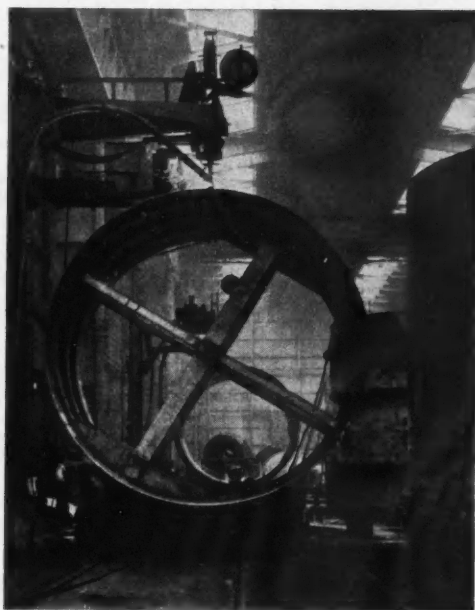
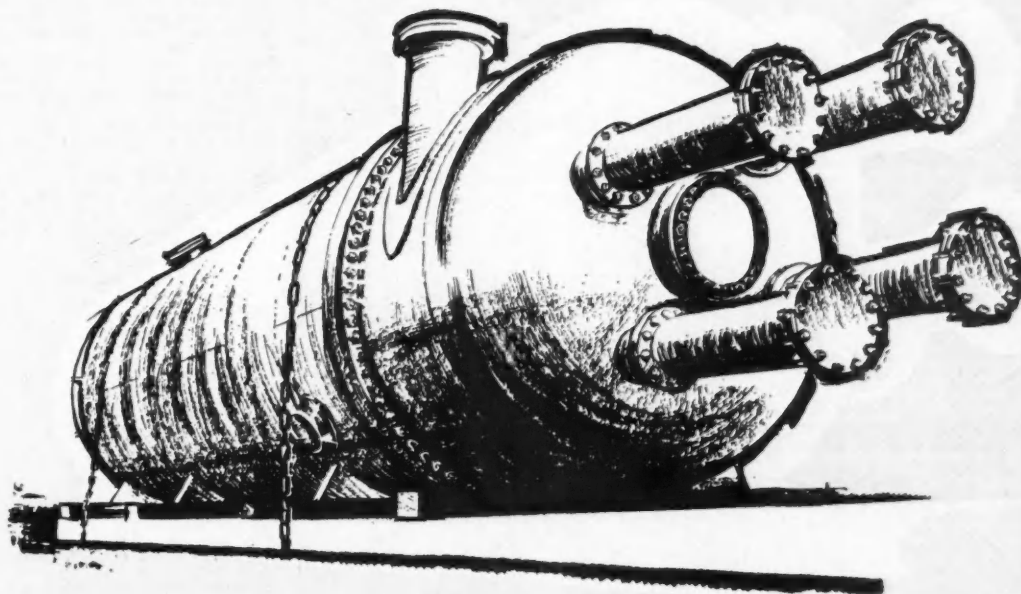
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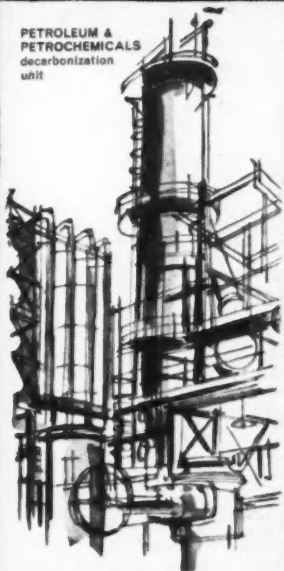
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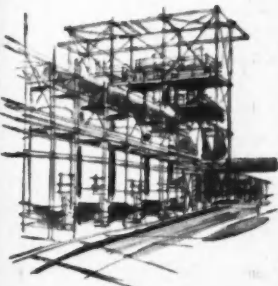


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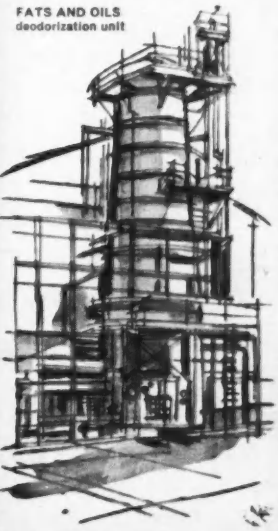
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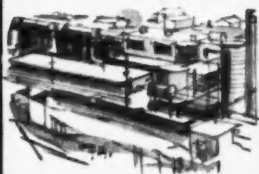
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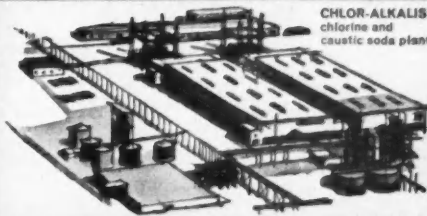
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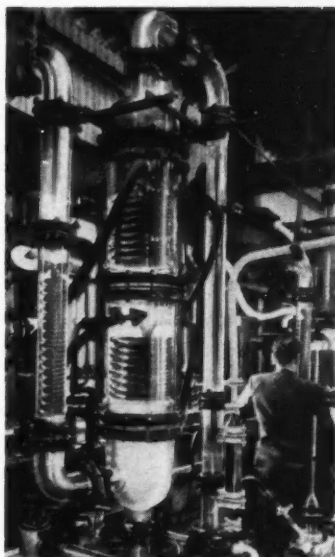
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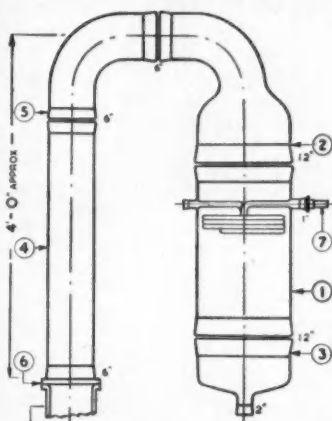


GLASS HEAT EXCHANGERS



Glass equipment used for Toxaphene production.

(Photo by courtesy of Cocker Chemical Co. Ltd.)



UNIT RD57/D6. Overhead glass distillation equipment generally used in conjunction with enamelled metal or similar vessels; made up of Q.V.F. standard glass components.

Item No.	Description	Cat. Ref.	Qty.
1	Heat Exchanger ...	HE.12/25	1
2	12" to 6" Pipe Bend Reducer ...	PBR.12/6	1
3	12" to 2" Pipe Reducer ...	PR.12/2	1
4	6" Pipe Section 36" long ...	PS.6/36	1
5	6", 90° Bend ...	PB.90/6	1
6	6" Glass Spacer 1/4" thick ...	SS.6/1/4	1
7	1" Hose Connector (metal) complete ...	MHC.1	3

PARTS LIST for assembly of Unit RD57/D6 with Q.V.F. STANDARD GLASS COMPONENTS

A Folder is available giving full descriptive details of this Unit. This folder also contains full information on four other Reflux & Distillation Units which are easily assembled from standard Q.V.F. Glass components.

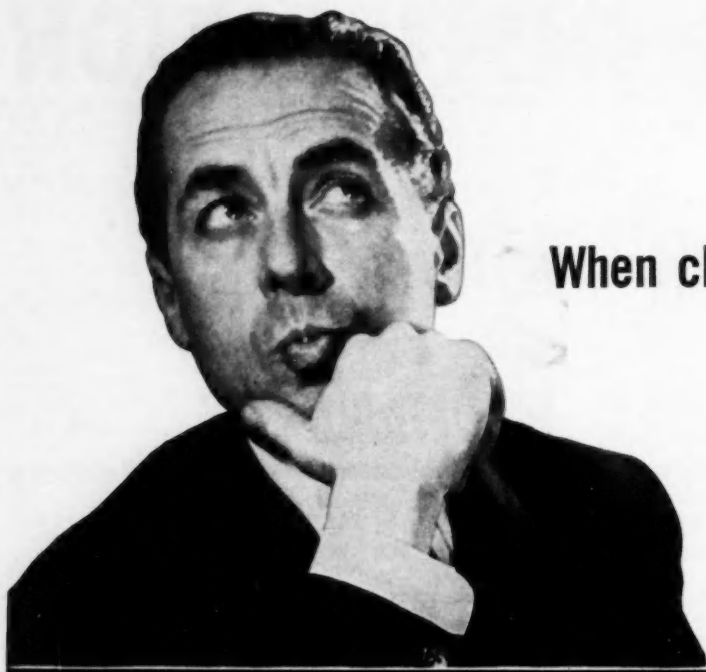
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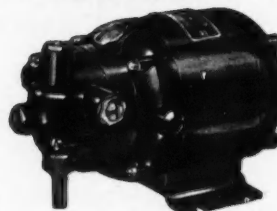
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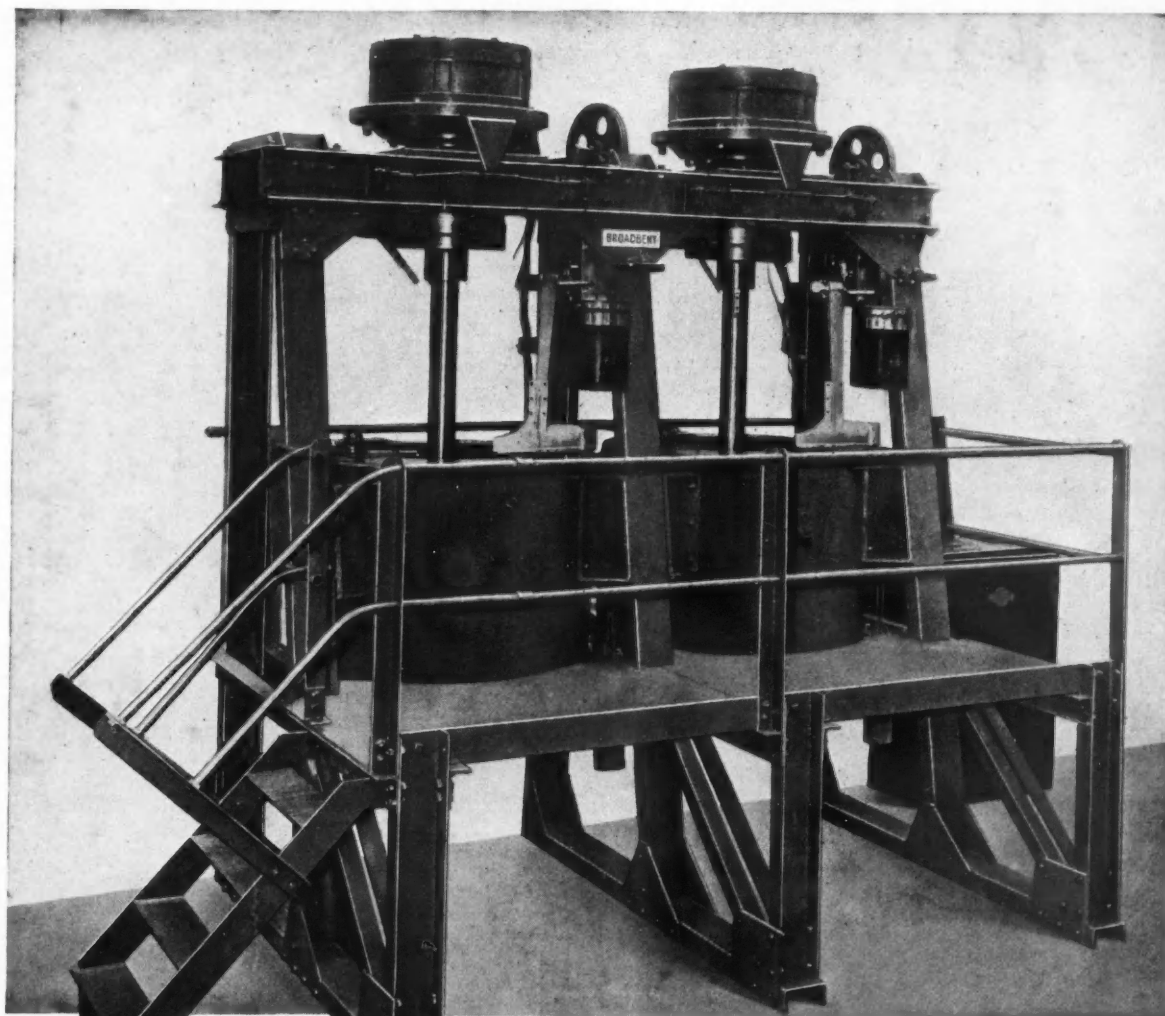
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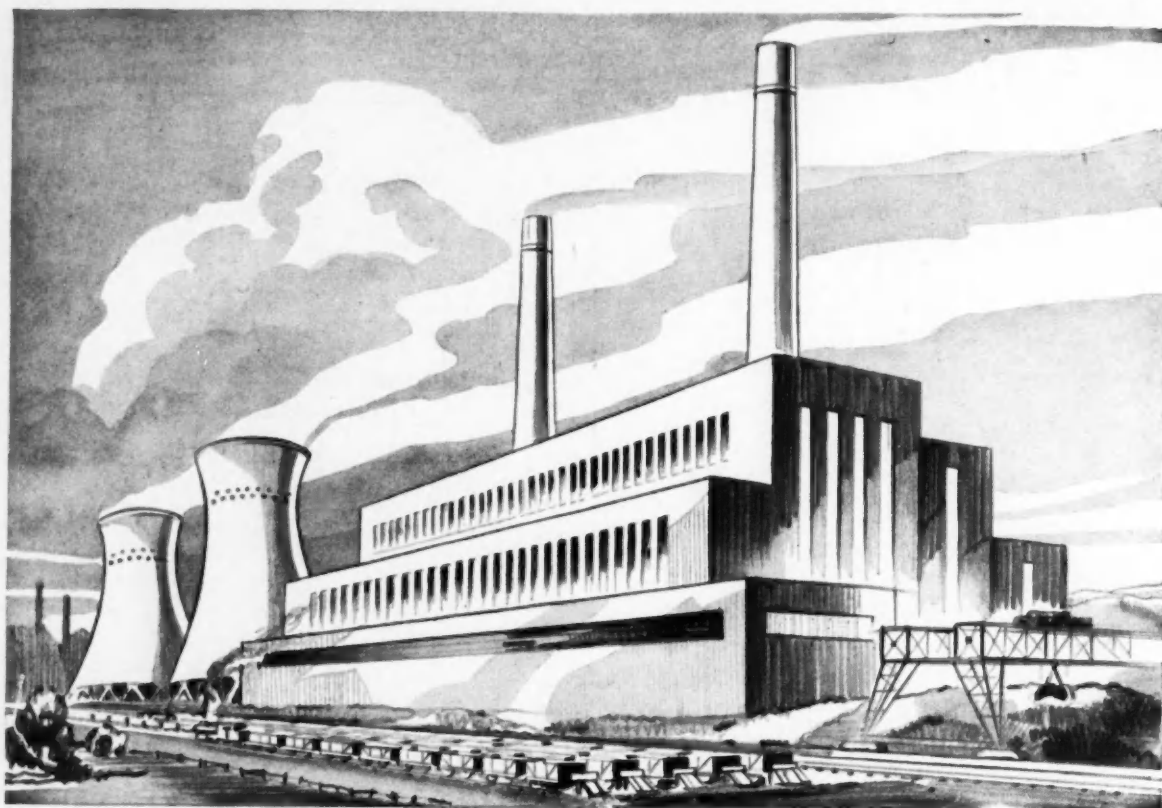
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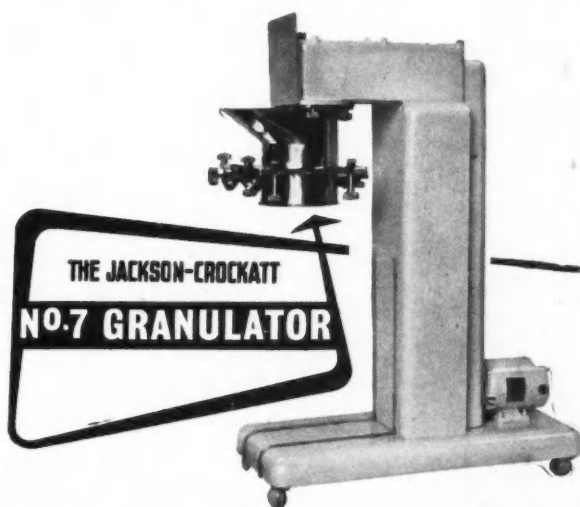
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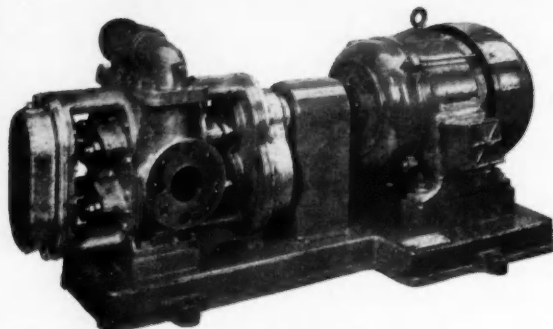
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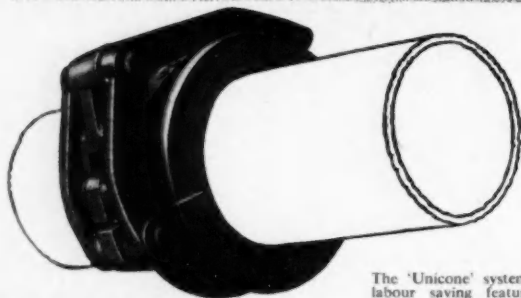
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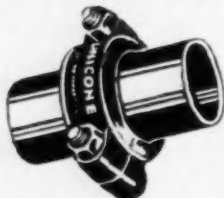
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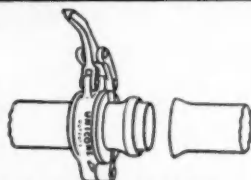


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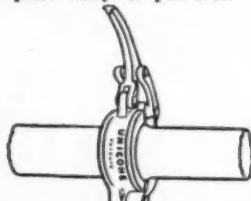
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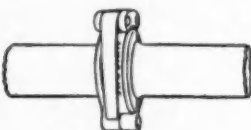
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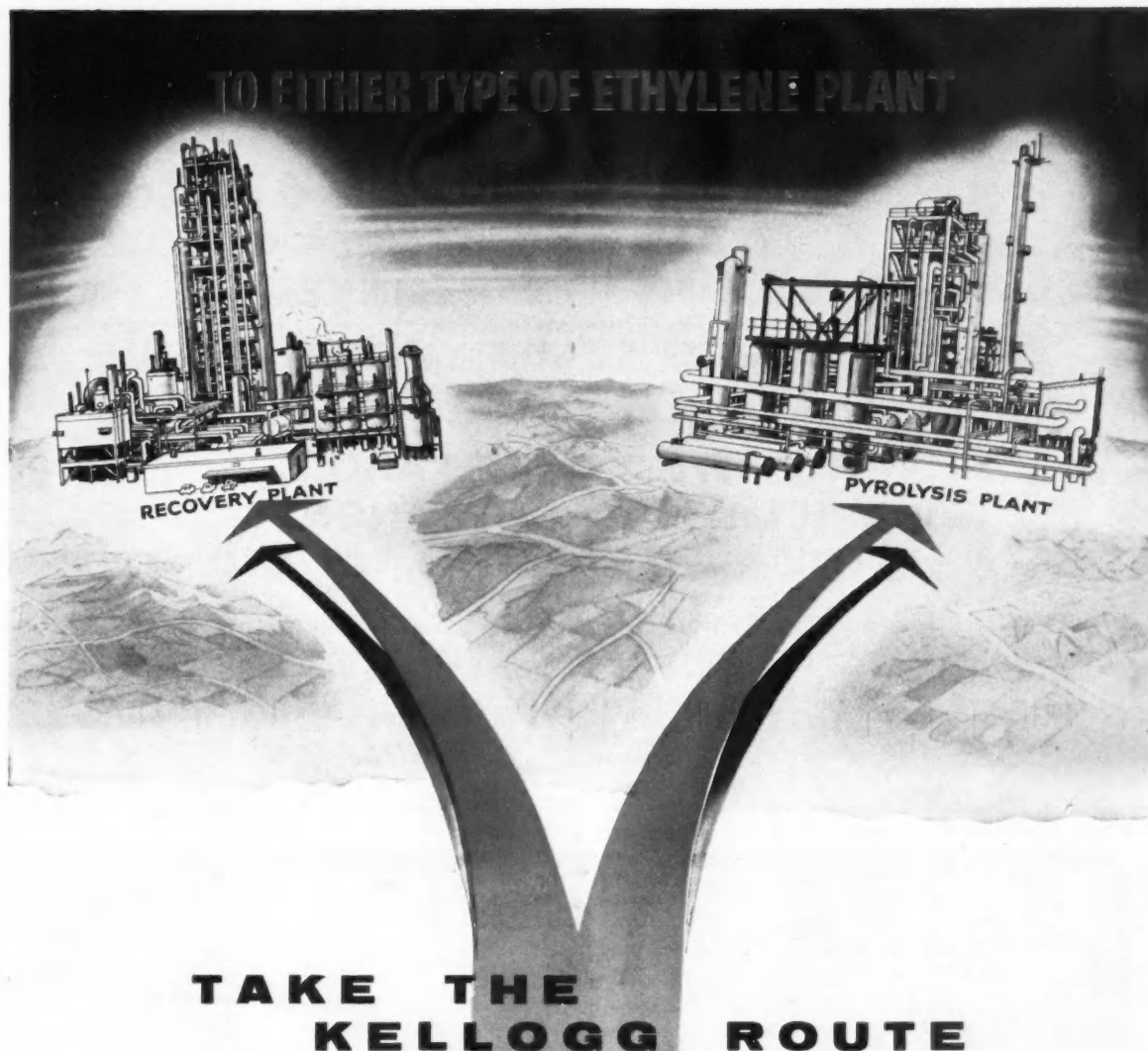
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CHEMICAL AGE

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N.R.D.C.'S WORK AND PLANS

TWO recent projects of world-wide interests and implication, the Hovercraft and the Bacon Hydrox fuel cell, have focused attention on the National Research Development Corporation. The function of N.R.D.C. is largely to bring interested parties together, to co-ordinate, to look after patenting activities and generally to see that projects are carried smoothly on their way. Almost every branch of science, excluding only atomic energy and gas turbines, is covered; activities include projects in every other field, except, inexplicably, civil engineering.

Much interest in Parliament has centred on the financial situation of the corporation. Managing director of N.R.D.C., Mr. John C. Duckworth, says that the corporation's activities can be divided into two parts (1) passive items and (2) the project side. In passive items, N.R.D.C. does not spend any of its own money on development. Patent rights reach them from universities and Government bodies, and the corporation deals solely with patenting and exploitation. Sole costs here are in administration and patenting. At present royalty income from these items is just about balancing the administrative costs.

On the project side, N.R.D.C. acts as a moneylender, to encourage development work, and finances here, Mr. Duckworth reports, are very much more complicated; expenditure in this field is very much an investment. Assets amount to technical know-how, and a patent right or a block of patents. With a 16 years' life to a patent, N.R.D.C. normally gets no money return in the first few years, and this development cost is written off over 10 years. As a return on capital, 10% has to be made at once to cover depreciation, about another 5% covers Board of Trade interest on the money borrowed, and a further amount covers administrative expenses. To cover development costs, the corporation has to make about 17% gross in all. This represents a considerable return and as N.R.D.C. cannot be successful in all cases, it means that rather more must be made out of successful projects.

Losses on the project side, as every industrial company knows, are not unexpected. The passive items, which the corporation exploits, costs the Government "many millions of pounds a year," Mr. Duckworth reports. From these millions N.R.D.C.'s income is about £2,000. This income, it is felt, could be greater and could offset the loss on the corporation's activities which while not profitable are, nevertheless, worthwhile. One way of doing this is increased contact with the universities and research establishments, to make them aware of the needs of industry.

Illustrative of this rather different aspect of N.R.D.C.'s activities is their support of the machine tools project. Some 3½ years ago, the corporation provided the Manchester College of Technology with a sum to enable them to start work on research and development in the field of applying of automation to machine tools. This is a long-term project and N.R.D.C. are now hoping that D.S.I.R. will take it over, since D.S.I.R. is a research organisation and the corporation a development organisation. One of the values of an organisation such as N.R.D.C. is that it is able to act quickly and enter a field where the problem is not always easily identified, but where support is obviously required.

The Hovercraft project and the Bacon Hydrox fuel cell have been fully dealt with in the last few weeks. A fairly new N.R.D.C. project is concerned with cephalosporin, a member of the penicillin family and having some of the properties of penicillin as an antibiotic. It has, however, an advantage over penicillin in that it is not affected by penicillinase. Working on the problem of penicillin resistance are the Medical Research Council Antibiotics Unit at Clevedon, Oxford, another M.R.C. group at Oxford and Glaxo Laboratories, who are producing the cephalosporin. N.R.D.C. financial contributions to this project are said to be "quite small", and its function is mainly to bring the bodies together, co-ordinate activities and look after patents. Chemical tests are to be made with cephalosporin within the next few months, when the future of this antibiotic will be known. If successful, N.R.D.C. expect pharmaceutical companies to come into the field on a large scale. The corporation should then reap a large return for its small outlay. I.C.I. are also interested in cephalosporin and have a patent (820,422) for production by fermentation that is due to be published on 23 September.

Fuel cell developments which have cost N.R.D.C. about £80,000 over a two-year period, are already being made to pay off; both financially and from technical know-how exchange arrangements. One U.S. organisation (N.R.D.C. does not reveal which company) is, through the corporation, supporting research at D.S.I.R.'s Warren Spring Laboratory.

Another of N.R.D.C.'s projects, the towing of oil in flexible containers—Dracones—is already well on the way to commercial success. (See p. 262).

N.R.D.C. shows by its work and results that it is acting as a lively catalyst in the scientific world, without very much capital outlay. The staff numbers 100, of which the purely technical staff total 35, but they have wide contacts with industry, the universities and Government bodies. It is, therefore, all the more difficult to understand British industry's apathy in allowing patents, etc., to be used by U.S. companies.

SULPHUR IN W. AUSTRALIA

ALTHOUGH modernisation of the pyrites treatment plant of Norseman Gold Mines N.L. has been completed, the benefits have been offset to some extent by three separate basic wage increases and the new Government royalty of 1s/ton of pyrites production.

The effect of these imports is increased, it is reported, by the fact that throughput is much lower than plant capacity. Cause of this state is increased imports of brimstone, a position that could continue unless the Government takes action to induce acid manufacturers to use more indigenous sulphur-bearing minerals. Withdrawal by the State Government of the freight subsidy, which has been under consideration, in conjunction with the restricted throughput would force the closing down of the mine.

At Norseman the heavy media beneficiation plant and flotation treatment plant operated satisfactorily for a restricted production of 39,000 tons of pyrites concentrate averaging 47.51% sulphur. Reconstruction of the flotation section to incorporate a six-cell 54 in. hog trough Fagergren rougher unit and enlargement of the cleaner cell capacity from two to four No. 24 Denver sub. A. cells, resulted in improved recovery and considerably improved concentrate grade, containing more than 48% sulphur.

HIROSHIMA AND POLAROGRAPHY

ONE paper arousing interest at the 2nd International Congress of Polarography at Cambridge last week was given by a group of Japanese workers led by Professor M. Shinagawa, of Hiroshima University, Hiroshima City, Japan. The morphology of the Brdicka catalytic wave

of hydrogen was considered. Now the shape of the Brdicka catalytic wave indicates involvement of adsorption phenomena and complex formations of cobalt with several kinds of ligands both in the cobalt wave and in the peak formation of catalytic hydrogen wave.

A surface active substance, and also methyl cellulose or sugar, change the single peak of cysteine into a double peak. Such adsorption can be elucidated by the methods of alternating current polarography, Sevcik's type oscillographic polarography and chromopotentiometry of cystine. A surface active substance, it has been observed, makes the mercury surface inactive and decreases the hydrogen overpotential to make a new peak while the protein in the filtrate of serum is found to have both surface activity at the mercury electrode and the complex forming ability. Co-ordination around cobalt atoms can be established with the line pair electrons of the atoms, such as oxygen, nitrogen or sulphur in hydroxyl, ammonia, amino acids or protein. The competition of those ligands to co-ordinate with cobalt according to the conditions near the electrode surface seems, Shinagawa *et al.* suggests, to have much influence upon the shape of the catalytic wave of hydrogen.

The catalytic wave analogous to the cysteine wave was produced by using hydrogen sulphide or onium compounds. Because of the interest in these findings, these Japanese presented data on peptides, cancer patients and Hiroshima victims of the atom bomb.

In the main this paper is sound as these Japanese workers are endeavouring to study the mechanism of the Brdicka catalytic wave. It is a reaction given by tissue breakdown which occurs in physiological conditions associated with growth in young children, pregnancy, and after heavy manual work, and in pathological condition such as infections, gross tissue damage and cancer. Their idea, therefore, is that if you can eliminate other possibilities it leaves cancer.

Much more statistical information will obviously be required on this point. In the case of the Hiroshima victims results seem to come out intermediate between cancer and non-cancerous persons but it is doubtful whether definite deductions can yet be made.

AIR-COATING FOR TABLETS

PARTICLE coating by the Wurster process, developed by Dr. Dale E. Wurster, University of Wisconsin, is seen as a valuable means of forming and coating tablets and also as offering interesting possibilities for granulating other materials.

The process comprises fluid-bed, spray drying and atomising techniques. The coating solution atomises into air stream and deposits on 16-80-mesh particles suspended in the stream. Particle attrition is stated not to be significant while agitation of the particles in the chamber keeps solid material from building up on the walls. The claim is made that better than 99% of coating material is utilised.

Equipment developed by Dr. Wurster has successfully coated pills, animal feeds, fertilisers, insecticides, etc., with such materials as waxes, cellulose derivatives, lipoproteins and resins. Wisconsin Alumni Research Foundation, Madison, Wisconsin, have been assigned the process and prototype equipment patents, and they intend to licence the technique as widely as possible.

Wurster's process, it is considered, can be used to coat particles too small for handling by conventional pan methods; apply multiple coats in a single operation without removing particles for mixing or drying between coats; granulate particles entirely within the system, building up an aggregate through successive coatings; and decrease coating or granulation time from hours to minutes. Several of the major U.S. pharmaceutical houses are understood to be piloting the process.

Explosion at Courtaulds' Maidenhead Research Lab.

Two senior physical chemistry assistants were burned, one seriously, in an explosion, during the afternoon of 26 August at the research laboratories of Courtaulds Ltd., at Maidenhead. The injured men, Mr. Gerald Faulkner and Mr. Eric Collingwood, were engaged in fundamental research on high polymers. Dense fumes came from the building after the explosion which wrecked valuable instruments and a small fire lasted for 20 minutes. Firemen had to wear breathing apparatus to deal with the outbreak.

Mr. Faulkner was near the site of the explosion and was severely burned; aged 28, he has since died in hospital. His colleague had just entered the laboratory.

P.G. Carburetted Water Gas Unit for Japan

LICENSEES in Japan of the Power-Gas Corporation Ltd., Stockton-on-Tees, Mitsubishi Chemical Machinery Manufacturing Co. Ltd., Tokyo, have received an order for a carburetted water gas plant, with a capacity of 2 million cu. ft./day, for the Saibu Gas Co. Four units each of similar capacity have previously been installed for the same company. The company's licensees in Japan have also received contracts for four gas producer units, each 10 ft. 6 in. in diameter, and for a CO conversion plant for Toho Gas.

Since 1954 the company's licensees in Japan have received orders for C.W.G. units with a total daily productive capacity of 118 million cu. ft.

Laporte Featuring H.T.P. at Farnborough

LAPORTE CHEMICALS LTD., Luton, Bedfordshire, are exhibiting for the first time this year at the S.B.A.C. annual flying display and exhibition at Farnborough. Laporte, who are the largest single producers of hydrogen peroxide in Western Europe, feature primarily highest hydrogen peroxide (H.T.P.) as a compact, safe source of power for the aircraft and guided missiles industries.

Laporte organic peroxides for use as initiation catalysts for the polymerisation of certain plastic materials and the Metklens range of a.i.d. approved metal cleaning compounds will be shown.

Blaw Knox to Build Plant for Petrolite

Blaw Knox Chemical Engineering Co. Ltd., 20 Eastbourne Terrace, London W.2, have been awarded a contract by Petrolite Ltd. for a synthetic chemical compounds plant. Erection work has started at the Petrolite factory, Kirkby Industrial Estate, near Liverpool, and the plant is scheduled for completion by the end of this year.

Petrolite, a wholly owned subsidiary of Petrolite Corporation, St. Louis, Missouri, will manufacture the major products of its parent company. These include Tretolite demulsifiers and desalting chemicals, Kontol corrosion inhibitors and Solvo paraffin solvents.

British Titan Board Approves £14 m. Expansion Programme

PLANS for extensions and entirely new plants estimated to cost in total some £14 million have been approved by the board of British Titan Products Co. Ltd. This news is announced by Dr. G. H. Beeby, British Titan's chairman.

The programme to meet increasing demands for Tiioxide, titanium dioxide, in



Dr. G. H. Beeby, chairman of British Titan Products, who was last year made a fellow of the Royal Institute of Chemistry

the U.K. and overseas, includes extensions of the two U.K. plants and of those in Australia and India, and establishment of new factories in South Africa and Canada.

In May this year B.T.P. announced the completion of an extension to the Grimsby plant bringing its total capacity up to 70,000 tons a year. The new development plan will extend the capacity of this plant to 85,000 tons a year and will include a comprehensive modernisation scheme to give greater flexibility to the whole plant and to allow for quality improvements and possibly, the manufacture of additional grades of pigments. B.T.P.'s total capacity of the U.K. plants at Grimsby and Billingham will then amount to some 105,000 tons a year.

British Titan have now decided to establish a company in Canada and a titanium oxide plant is to be set up at a cost of some £6 million. Initial capacity is to be 20,000 tons a year and both rutile and anatase will be produced. In designing the plant, room for large future extensions is being allowed. It will be a self-contained unit, making its own acid and manufacturing titanium oxide from titanium slag which is already produced in Canada. Location of the plant, however, has not yet been fixed.

Tiioxide pigments have been sold in Canada by B.T.P. since 1950. In fact, in that year 19% of the titanium oxide sold in Canada came from B.T.P., and by 1957, B.T.P.'s share had grown to 49% of the market against U.S. competition. At the same time the Canada market has grown so much that B.T.P. sales in 1957 were four times the 1950 total and represented a very high proportion of the U.K.'s exports of chemical products to Canada.

In Australia, B.T.P.'s wholly-owned subsidiary, Australian Titan Products,

have continuously expanded the plant at Burine, Tasmania, since it began operations in 1949. By the end of this year, output will have been raised from 8,000 to 10,000 tons a year. By early in 1962, the capacity of this plant will have been increased to 16,000 tons a year and still further extensions are planned which will bring capacity up to 20,000 tons a year by about the end of 1964.

Production at the Trivandrum, India, plant of Travancore Titanium Products, in which company B.T.P. have a substantial minority shareholding, is expected to increase from 1,800 to 3,600 tons a year by 1961. The Indian market for titanium dioxide, Dr. Beeby records, is expanding and is likely to continue to do so as industrialisation proceeds in India.

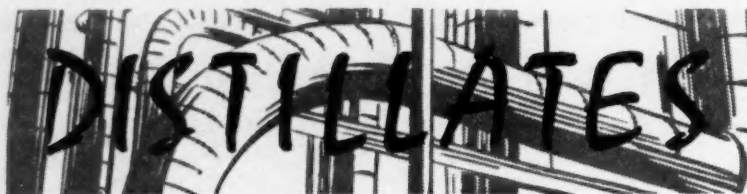
The plant to be set up by B.T.P. in association with African Explosives and Chemical Industries Ltd., at Umbogintwini, near Durban, South Africa, is expected to be completed in about 1962 and will have a capacity of 100,000 tons a year. Sulphuric acid and steam will be drawn from the works of A.E. and C.I., and ilmenite from neighbouring mines at Umgababa, which are already supplying "very substantial tonnages" to B.T.P.'s plants in the U.K.

Incorporated in 1930, B.T.P. celebrated their 25th anniversary in July last. To commemorate the occasion Dr. Beeby presented leather wallets to each employee of the company (for female staff — leather purse-wallets). He stated that in their first year B.T.P. produced about 2,000 tons of pigment. This year the company expected to produce nearly 90,000 tons in the U.K. plants alone. B.T.P. are thus the largest producer of titanium pigments outside the U.S., and they intend, Dr. Beeby notes, to retain this position.

Ordinary capital of B.T.P. is £8 million, of which about 30% each is owned by Imperial Smelting Corporation, Imperial Chemical Industries and Goodlass Wall and Lead Industries, and about 9% by R. W. Greeff and Co. It is understood that the method of financing the proposed expansion has not yet been decided but that the company hopes to meet a fair proportion out of retained earnings.

Aerox to Open New Factory at Stroud

The Glasgow firm of Aerox Ltd., manufacturers of porous ceramics and ancillary components and filters used principally in the chemical industry will shortly open a new factory at Chalford, near Stroud, Glos. The new factory is expected to open about the third week in September. The firm has a branch at Crawley, Sussex, where a nucleus of men recruited from the Stroud area are receiving training.



★ Two years of special research work in a new field of chemical engineering were lost on Sunday night when fire broke out in a small 8 ft by 10 ft laboratory in the Chemical Engineering Department of Birmingham University. The laboratory—only a very small part of the department—was completely wrecked. A special piece of apparatus for measuring absorption rates of H_2S and CO_2 in water under pressure was destroyed.

No cause for the fire has yet been found, but some apparatus was left to run throughout the night.

It is understood that the work, which was being carried out by one of the department's research students, had led to some very valuable results.

★ INVESTIGATIONS into the cause of a refinery explosion at Roseburg, Oregon U.S., that killed 14 and injured 48 people show that the lorry involved was carrying 'nitro carbo nitrate' and dynamite. Nitro carbo nitrate is ammonium nitrate sensitised with carbonaceous materials, in this case diesel oil. Fertiliser grade ammonium nitrate will not explode unless mixed with organic matter such as oil.

In the Roseburg incident, the additional hazard lay in transporting nitro carbo nitrate with dynamite, a view upheld by Dr. M. A. Cook, director of the Institute of Metals and Explosives Research of Utah University. Dr. Cook was chief witness for plaintiffs in the suit brought against the Government following the Texas City Explosion of 1947.

★ IMPLICATIONS of the Bacon Hydrox Fuel cell patents being licensed to a U.S. company were considered last week (CHEMICAL AGE, 29 August, p. 213). I learn from a recent talk by Mr. John C. Duckworth, managing director of the National Research Development Corporation, which is supporting Bacon's work and which holds the patents, that the question of the U.K. losing its present advantage has been carefully examined.

Mr. Duckworth points out that there has to be a user at some stage in the proceedings to press development along. In the absence of a user in this country, there is, he admits, a danger that the U.S. could get ahead of us. N.R.D.C. is therefore making agreements with U.S. firms (British industry please note use of the plural).

Fortunately N.R.D.C. has now had considerable experience in making agreements which redound markedly to our advantage, in the event of the U.S. organisations finding useful results and exploiting them in America. At this stage

we are in a good bargaining position as we know more than the U.S. companies, and we get the advantage of the money they are spending in taking up the patents.

★ AN EXPLANATION for the variable results from use of DDT in ponds, lakes and other mosquito breeding areas is offered by a finding made by the U.S. Department of Agriculture chemists and entomologists at Orlando, Florida. They have found that DDT at one part per hundred million in water does not remain in uniform suspension, but codistills with evaporating water and tends to concentrate at the surface and at the walls of containers.

This unusual behaviour is a surprise as it has never been noted despite the extensive use of DDT for many years. Other insecticides such as parathion, malathion, lindane and dieldrin, have not shown this action.

★ WITH the Packaging Exhibition opening in London this week, I was interested to learn that this year I.C.I.'s Billingham Division has been using paper sacks for its fertilisers at the rate of 20 million a year. This has meant a big change because jute, the traditional sack material, had previously been used. But these have never been completely satisfactory.

The ordinary jute sack offers almost no protection against damp and farmers often found the outer layer of fertiliser reduced to a sticky mass. Now 80% of Billingham's C.C.F. (concentrated complete fertiliser) is packed in paper sacks.

This big shift from jute has not affected the Dundee jute mills, for I.C.I. obtained their jute sacks direct from Calcutta. In fact Dundee has benefited from the changeover because the special multiply kraft-paper sacks are made in that city.

★ CONVERSION of footstuffs into fatty acid—the chief component of fat—by the body has been explained by a University of Wisconsin biochemist. Dr. Salih Wakil of the Institute for Enzyme Research in the department of Professor David E. Green (*J. Amer. Chem. Soc.*, May issue). Dr. Wakil's new theory marks the final step of departure from the idea that synthesis of fatty acids is the reverse of fatty acid oxidation.

It has been assumed widely that synthesis was simply a two-carbon by two-carbon addition until a 16-carbon chain-palmitic acid was formed. Dr. Wakil reports that "it can now be stated with confidence that fatty acids are synthesised

by an entirely different mechanism than the one for stepwise oxidation of long-chain fatty acids." These are oxidised in the mitochondrion, while fatty acids are synthesised outside the mitochondrion.

Last December, Wakil reported that the first step beyond the building block—acetic acid or acetyl CoA—in the build-up of a fatty acid chain had been isolated and identified as malonic acid which was found to be the partner in the reaction which keeps the chain increasing. Two other important clues, reported a year before by Dr. Wakil, were that both the vitamin biotin and carbon dioxide are required for synthesis. A biotin-containing enzyme was evolved in the linking of carbon dioxide to acetyl CoA in the formation of malonic acid.

Dr. Wakil's new theory pictures the first step in the mechanism of synthesis as the addition of a third carbon atom to acetyl CoA, the third carbon coming from carbon dioxide. This produces the three-carbon malonyl CoA. In each succeeding step in the build-up of a long-chain of fatty acids into palmitic acid, the constantly forming malonyl CoA molecules join with acetyl CoA—the building block—to give a five-carbon compound. Then a carbon dioxide molecule is 'clipped' off, leaving a four-carbon compound. To this is added another malonyl CoA to make a seven-carbon acid before the loss of another carbon dioxide reduces it to six. The step by step addition continues until the 16-carbon chain called palmitic acid is formed.

The study of synthesis is nearly complete. All that remains to be done is identification of the individual enzymes in the aggregate which controls the combination of acetyl CoA and malonyl CoA to form fatty acid.

★ THE first insecticidal paints of their type available in the U.K. are a new range, marketed under the name of I-Gene and made by the Leyland Paint and Varnish Co. Ltd., Leyland, Lancs. The coatings can be used in both temperate and tropical climates, can be applied by brush, roller or spray in the same way as normal paints.

The insecticides incorporated in I-Gene coatings are Shell Chemical Co.'s aldrin and dieldrin. They are retained in the coating indefinitely and are released to the surface as a 'bloom' of crystalline insecticide. This 'bloom' can be temporarily removed or disturbed by severe cleaning, but renews itself on the paint surface within a few hours. Insects making contact with the 'bloom' are said to be quickly paralysed and killed.

A clear lacquer in the range can be used on plain woodwork to protect against woodworm and termites. The paints are non-poisonous to humans and have no harmful effect on animals.

Alembic

Rapid Means of Separating Mixed Polymers

A RAPID method of separating mixed polymers is reported in the current issue of *Nature* (11 July, No. 4680, p. 116) by W. J. Langford and D. J. Vaughan, Tufnol Ltd., Perry Barr, Birmingham. They were seeking a method of separation which would not require a complex chemical procedure, such as chromatographic separation on columns.

The method devised employs paper chromatography. The mixed copolymers in solution (iso-butyl ketone) are spotted on to a strip of Whatman's No. 4 filter paper and air-dried. This strip is then allowed to run at room temperature for 45 minutes, using the same solvent. The strip is then air-dried and sprayed with a solution of one part B.D.H. Universal Indicator and one part distilled water. The whole strip is then washed in distilled water and dried.

Langford and Vaughan found that the acetate strip remained stationary, while the chloride moved with the solvent front. Rf values were for chloride 0.985 and 0.0 for the acetate. Both spots were eluted, yielding positive tests for acetate and chloride respectively.

Accuracy of the separation was tested by mixing two pure polymers of acetate and chloride in the solvent. These were then spotted on to a No. 4 filter paper and run as a control. Identical results were obtained as with the mixed polymers.

Bulk Salt Delivery for Cooke's Explosives

First bulk consignment of salt to be delivered by an I.C.I. road tank wagon to Cooke's Explosives Ltd., North Wales, was made recently. Cooke's have installed two new salt silos each with a capacity of 26 tons, which is a usage cover of about three weeks. This has eliminated the need for providing filling, loading, unloading, stacking, emptying and disposal of paper bags. Storage space is considerably reduced and the filling and emptying of the two silos alternately makes the caking of salt through storage for long periods under pressure extremely unlikely.

Bradford Course in Chemical Engineering Recognised

Course in chemical engineering of the Bradford Institute of Technology has now been recognised for the award of the Diploma in Technology. In addition, the institute is now running one-year, full-time, postgraduate courses in chemical engineering for graduates in chemistry (Higher National Certificate or equivalent) and mechanical engineering, as well as a three-year, full-time London external degree course.

Bradford Course on Recent Polymer Developments

'Recent developments in the chemistry of natural and man-made fibre-forming polymers' is the subject of a special two-day course to be held at the Department of Chemical Technology, Bradford Institute of Technology, on 30 and 31 October. Details are available from the registrar.

London Venue for Analytical Chemistry Summer School



General view at the opening of the summer school. Front row left is Dr. C. W. Herd, R.I.C. vice-president, who presided

THIS year's 'Summer school in analytical chemistry' arranged by the Royal Institute of Chemistry with the participation of the Society for Analytical Chemistry, was held at the School of Pharmacy, University of London. Three courses were arranged for more than 200 members, covering instrumental organic analysis; modern inorganic analysis; and gas chromatography.

Professor W. H. Linnell, Dean of the School of Pharmacy gave the opening address on Monday, and Dr. C. W. Herd, vice-president, R.I.C., presided. The School of Pharmacy is still under construction, although all the laboratories have now been completed.

London University's aims in pharmaceutical education were outlined by Professor Linnell, who pointed out that today 80% of the U.K.'s fine chemical industry was made up of medicinal products; more changes had occurred in pharmacy in the last 30 years than in

any branch of chemistry. The Pharmaceutical Society of Great Britain was seeking to do away with the pharmaceutical diplomas and to institute degree courses in pharmacy instead, a situation which might be realised some three years hence.

In the London School, emphasis appears to be on chemistry and pharmaceuticals and a course in higher mathematics is a must. A new subject is engineering science and considerable importance is attached to the course on instruments for physical and quantitative analysis. Pharmacognosy is now considered as applied botany. 'Cinderella' of pharmacy studies is inorganic chemistry, but Professor Linnell said that more attention is now being paid to this section of chemistry in view of the growth of radiochemistry; pharmacists would be required soon to dispense and break bulk radioactive materials, and to establish radioactivity of preparations.

Tantalum Metal Soon to be Produced at Murex's New £400,000 Plant

DEMAND for pure molybdenum increased during the last few months up to April 1959, reports Sir Arthur Smout, chairman of Murex Ltd., in his review of the company's activities. The new molybdenic oxide plant was able to achieve a high level of activity; and the results as regards both the purity of the product and the costs of production were "extremely satisfactory."

The new tantalum/niobium plant at Rainham, Essex, has been substantially completed, it is noted, and certain sections are already in operation. Extraction of niobium and tantalum is now being carried out in the new plant and tantalum double salts, such as potassium tantalum fluoride, are also being produced there. Reduction to tantalum

metal is just about to be started, but reduction to niobium metal is being carried out in the old plant. The niobium section of the new plant is still under construction, as efforts have been concentrated upon the tantalum section. Estimated cost of the new plant, *CHEMICAL AGE* learns, is £400,000.

Sales of tantalum products were higher than in the previous year, Sir Arthur reports, but no imports of tantalum powder were necessary and requirements for the fabrication departments were met from Murex's own resources. Competition from both Europe and the U.S. was keen and selling prices fell substantially. Demand for pure niobium was slight, it is stated, although there is a growing interest in the metal from research and development groups.

Flame-retardent Polythene now in Commercial Production

MAKING flame-retardent polythene on a regular tonnage basis are C. J. W. Macaulay, National House, 60-66 Wardour Street, London W.1. Known as F.R. polythene, it is produced from virgin blended polythene (low density, high pressure process) and boron-chloro-oxide derivatives with thermo-antioxidant inhibitors. With use of inorganic pigments it can be coloured to practically any shade.

Development of flame-retardant polythene has been to produce a grade suitable for injection moulding—of special advantage when moulding plugs, terminals, control boxes, multi-connections, connection joints, etc. All the dielectric characteristics of polythene have been retained. Also, F.R. polythene is stated to have practically no shrinkage value and it may be used in conjunction with metal insert and other dielectrical materials such as thermosettings and mica.

Two grades of F.R. polythene are available—heavy duty and standard—based upon their melt index. The heavy duty grade has a melt index of 1.85 and the standard grade, an index of 6.25. Due to the nature of the blended polythene compound as stated above, these figures cannot be directly compared to conventional polythene melt index figures. Specific gravity is, according to type and grade, $2.19 \pm$ and Viscat softening point is: heavy duty grade, 92°C and standard grade, 88°C . Dielectric constant is stated as A.S.T.M. —D.150 —47T (30 c/s to 100 mc/s) ± 2.7 ; power factor —A.S.T.M. D.150—47T (10^6 c.p.s.), 0.002; and volume resistivity, A.S.T.M. —D.257—54T (ohms cm.) $\pm 10^9$. This plastics material conforms with A.S.T.M. D.635—44, flammability and self-extinguishing test. A British standard specification is in course of preparation.

Suggested applications for the heavy duty grade are submarine and power cable, sheathing for high frequency cable, external electronics and neon lighting

leads. The standard grade is recommended for household electrical wire, multi-cord telephone cable, switchboard wiring, electrical connectors and electronic devices, flame-proofing, packaging and wrappers, and coated fabrics and draperies. The material is supplied in multi-wall kraft paper bags holding 50 lb.

Expanding World Demand Expected for Dracone Flexible Containers

AFTER much successful experimental work by themselves and by oil and chemical companies—including I.C.I., Shell-Mex and B.P. and Esso—Dracone Developments Ltd., 7 Tilney Street, London W.1, have issued a report on their flexible containers for liquids—Dracones. These have now been proved in service and are expected to find an expanding world demand.

The present Dracones are made of special types of synthetic rubbers because they were designed to contain petroleum products. For many types of liquid chemicals and vegetable oils, other and possibly cheaper lining materials can be used. The strength is derived from the envelope of very strong woven nylon fabric, chosen for its high-tensile and tear strengths. Inside of the fabric is proofed with acrylonitrile-butadiene rubber (British Geon's Hycar). Outside coating is of neoprene which in addition to good oil resistance has excellent resistance to abrasion, sunlight and salt water.

For the 40-ton Dracone, the coated fabric is about 0.15 in. thick and for the 350-ton container, it is about 0.26 in. There is no air space, the Dracone being kept afloat by the buoyancy of its cargo. There can, therefore, be no explosive mixture in the vessel and fire risk is greatly reduced. Fabrics are joined by sewing and this joint strength is substantially equal to that of the fabric. It will maintain its strength even after pro-

H.N.C. Course for Technicians Working on Automatic Control

To meet the needs of technicians in the field of instrumentation and automatic control, the Joint Committee for National Certificates in Applied Physics is prepared to consider a modified form of Ordinary and Higher National Certificate course. Students successfully completing the H.N.C. course will be granted the same measure of exemption from the graduateship examination of the Institute of Physics as that available for the normal H.N.C. course.

longed use with aromatic solvent cargoes.

The Dracone is said to have readily withstood rough seas, damage by rocks, jetties and vessels, etc.; as the cargo is at very low pressure, the fabric skin yields easily.

Rate of filling and emptying depends on the available pump; a compact unit, weighing 6 cwt., consisting of a Petter air-cooled diesel engine and a Goodyear pump will empty a 10,000 gall. Dracone in one hour; filling by gravity can then be completed in 15 minutes. Several different methods of filling and emptying are being investigated.

New Features for 1960 Chemical Age Directory and Who's Who

New features will make the 1960 edition of the CHEMICAL AGE DIRECTORY AND WHO'S WHO of greater value to industry and science than ever before. For the first time the chemistry and chemical engineering departments of the U.K. universities and advanced colleges of technology will be listed. In addition, all technical colleges that provide courses in chemistry and chemical engineering will be listed, each entry showing the courses available.

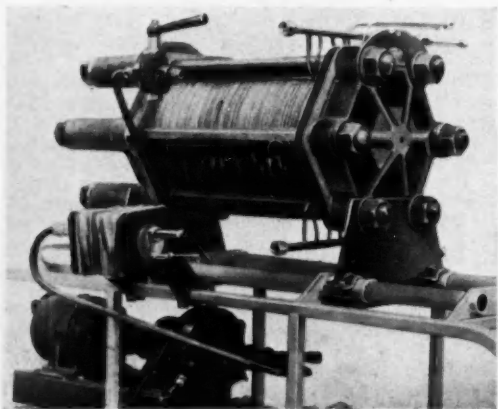
Listing of the principal chemical and allied associations and societies has been expanded and will contain 100 new entries, including overseas chemical associations. The Who's Who section, which last year comprised 72 pages, will total more than 90 pages.

The Buyers' Guide has been completely revised by an independent panel of trade experts. The Buyers' Guide, which will contain more than 3,500 product headings, is now open to any manufacturer of chemicals, chemical plant, laboratory equipment or related supplies, whether or not they are advertisers. For readers' convenience, the Buyers' Guide will be divided into two sections covering chemicals; and chemical plant, laboratory equipment, etc.

The Directory Index will give the names, head office and addresses and telephone numbers of all companies whose products feature in the Buyers' Guide.

Cost of the CHEMICAL AGE DIRECTORY AND WHO'S WHO is £3 3s.; the 1960 edition, however, will be supplied free of charge to subscribers

Kanigen for Hydrox Fuel Cells



Bacon's Hydrox fuel cell showing the 40 cells of the unit. Each of these plates has been Kanigen-plated. The Kanigen process, state Albright and Wilson, has been shown to give better results over pure nickel in the fuel cell. (See 'Chemical Age,' 29 August, p. 123)

Chemical Age Preview of New Developments at the Packaging Exhibition

AMONG numerous new developments to be shown at the International Exhibition which opens at the Olympia, London on Tuesday, 8 September, are many of interest to the chemical and pharmaceutical industries. These are summarised briefly in this special CHEMICAL AGE preview. The exhibition closes on Friday, 18 September.

Development in Vials

In addition to vials with neck fittings to take polythene closures and screw caps, **Anchor Glass Co. Ltd.**, Brent Cross Works, North Circular Road, London N.W.2, will show vials that take the newer snap-plug closure, specially designed with an inner plug fitting which permits the vial to hold solids, liquids or powders.

Two-layer Prescoter

The new Kilian two-layer Prescoter, to be shown by **Anglo Continental Machines Ltd.**, 41 Dover Street, London W.1, has two hoppers. This rotary tablet press can be used for ordinary or coated tablets, and is suitable for core tablets with two or more coatings. With an hourly output of 12,000 to 30,000 ordinary tablets (up to 25,000 for coated tablets) the models have a maximum pressure of eight tons. There are 20 upper and 20 lower punches; the dies also total 20.

Power Handling Equipment

The newly formed company, **Areco-Alite Ltd.**, Pixmore Avenue, Letchworth, Herts, following the merger of Alite Machines Ltd. and Areco Ltd., will feature the Kisab range of strip packing and wrapping machines and heat sealers, sales agency for which has just been acquired. Alite powder handling equipment to be shown includes vial and ampoule washing and filling machinery, Alite elevator and distributor unit designed to handle bulk supply for single-floor factories, and the Alite mixer, with a range of capacities from 2 cu. ft. to 100 cu. ft.

Thermoplastic Melt Adhesives

A new system of thermoplastic melt adhesives will be featured by **B.B. Chemical Co. Ltd.**, Ulverscroft Road, Leicester. The adhesives are in the form of coiled rod which is fed into thermostatically controlled applicators and melted as needed. Rapid bonding is possible; drying time is eliminated so that the bonding of difficult impervious materials, such as polythene and polythene-coated materials, moisture-resistant films, etc., is readily accomplished.

Wood Wool Pads

New developments in the use of wood wool pads will be featured by **J. and W.**

Baldwin (Manchester) Ltd., Mellors Road, Trafford Park, Manchester 17. Originally produced only with an outer cover of kraft paper, they can now be supplied in wax paper, crepe paper, weather-resisting paper, V.P.I. paper and hessian. Thickness varies according to the article to be packed.

Plastics Bottles

Rhenopac bottle forming equipment made by **Franze Baumann and Co.**, Talstrasse 39, Zurich, is claimed to produce plastics bottles at a competitive price. The model converts the inserted plastics sheets into containers of any desired form and size up to 1 litre, producing some 3,000 packages an hour. A wide range of plastics materials have been tested and the best results have been achieved with rigid p.v.c. and low-density polythene.

Stirrer Drum

Their new M type stirrer drum, to be introduced by **Victor Blagden Ltd.**, Plantation House, Mincing Lane, London E.C.3, has full opening head and removable agitator designed for convenient power coupling. Lacquer-lined drums will be a major feature.

Polypropylene Sheeting

British Celanese Ltd., Celanese House, Hanover Square, London W.1, who are now producing extruded polypropylene sheeting and extruded high density polythene sheeting, anticipate that both will find increasing use in the chemical industry because of their high resistance to chemicals of many types. Both also have a high temperature resistance which makes them suitable for the production of sterilisable packs. Polypropylene sheet is available in gauges from 0.01 in. to 0.08 in. in sheets of about 56 in. by 26 in. Gauges up to 0.03 can be supplied in reel form if required.

New Film Material

New packaging films to be shown by **British Cellophane Ltd.**, 9 Henrietta Place, London W.1, will include various types of polythene, Polycell polythene-coated cellulose film, polystyrene, p.v.c., and nylon. Different types of Cellophane cellulose film will be shown, including MXXT/A.

Polythene/Paper Bags

Examples of the double-sided treatment of sheet film for use in the Duplex type of paper-backed/polythene fronted bag will be exhibited by **British Visqueen Ltd.**, an I.C.I. subsidiary, Imperial Chemical House, Millbank, London, S.W.1.

Sidac Cellulose Films

Among the range of Sidac transparent cellulose wrappings in non-moisture-proof types to be shown by **British Sidac Ltd.**, 98-124 Brewery Road, London

N.7, will be MXXT. This is a cellulose film coated with copolymers of vinylidene chloride. Moisture protection is high because creasing, printing and heat-sealing operations do not impair the moisture-proof values.

New Mapac Drum Liner

In addition to their normal range of chemical lay-flat bags and block-bottom liners, **Mark Anthony and Sons Ltd.**, Chalk Hill, Watford, will feature a new



Base of a drum liner by Mark Anthony from Bexthene film extruded from Bakelite polythene, showing the new form of attaching the base to the walls of the liner by a heat sealing process

type of Mapac liner. Completely round-based it will fit into any keg or drum and offer maximum protection to the contents by preventing seepage into inaccessible corners that cannot be emptied. Also to be introduced is a polythene glove for handling all types of chemicals and allied products, said to be cheap enough to be disposable.

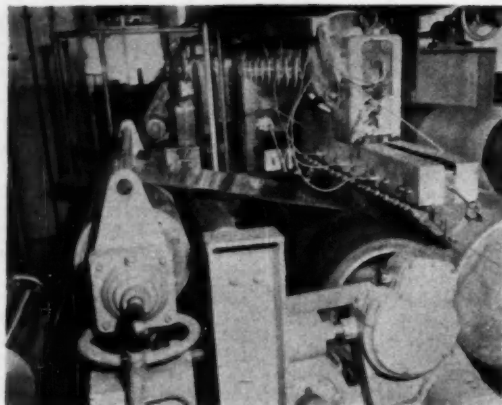
New 5-gall. Square Drum

Of new design, incorporating the interrupted type chimb, is a 5 gall. square drum to be introduced by **E. A. Brough and Co. Ltd.**, 4 Upper Parliament Street, Liverpool 8. This container, which combines attractiveness with functionalism, is offered with a variety of closures. Designed for the export trade, it is said to give a saving of about 20% storage space over the conventional cylindrical package, to stack and nest with safety; and unlikely to become unbalanced when stacked several high.

E. A. Brough have completed installation of a shot blasting plant to meet the demand of the chemical trade for a specialised drum with a quality internal lacquer lining. The new plant meets the need for efficient bonding and adhesion. For the present, sizes are restricted to drums of 20-45 gall. capacity, but the plant can handle smaller containers down to 5 gall. sizes.

Polythene-coated Aluminium

An interesting development so far as the chemical trade is concerned is the new packaging medium of **Fisher's Foils Ltd.**, Exhibition Grounds, Wembley, Middlesex—a thin foil of aluminium with an extruded polythene coating. Molten polythene is extruded directly



Extruding molten Bakelite polythene direct on to thin aluminium foil at the works of Fisher's Foils Ltd.

on the foil. The inertness of polythene to a wide range of chemicals will, it is hoped, enable the advantages of an aluminium foil pack to be more widely used in the bulk packaging of chemicals.

BX Plastics Products

Evaluation quantities of Bextrene extruded toughened polystyrene sheet are now available in a grade suitable for vacuum-forming of box liners, shock cushions, etc., state **BX Plastics Ltd.**, Chingford, London E.4. It is hoped to introduce "interesting new developments" in the grades of Bextrene polystyrene moulding powder for packaging applications. New high-clarity and high-impact grades of Bextrene polythene will be shown.

Plasticised P.V.C. Pipewrap

Of particular interest on the stand of **Dalmas Ltd.**, Junior Street, Leicester, will be Klingfast plasticised p.v.c. with good resistance to acids, alkalis, corrosive chemicals, water and oil in grades of 0.010 in. and 0.020 in., and for high-temperature detergent-resistant floor marking.

Glastics Ceramic Labelling

Glastics ceramic labelling for glass containers is to be introduced by **Glastics Ltd.**, Park Road, Barnet, Herts. The ceramic 'label' which can be of almost any colour or colour combination is screen-printed on to the glass. The impression is then fired-on, giving a label that is legible throughout the life of the container, and one that is said to be unaffected by handling, moisture, sunlight or the action of the contents.

Shrinkable Pliofilm

A new shrinkable Pliofilm will be exhibited for the first time by the **Good-year Tyre and Rubber Co. (Gt. Britain) Ltd.**, Wolverhampton. Marketed by E. S. and A. Robinson under their trade name Shrinkwrap, the process will be demonstrated for the wrapping of poultry. It consists of molecules of the original film aligned in a definite direction by the orientation process. Additionally it has all the inherent qualities of Pliofilm—moisture protection, high gas transmission rate, strong and ductile at low temperatures, resistance to puncture by projections—and

even greater mechanical strength. The skin-tight wrap is obtained by momentarily heating the package in a hot air tunnel or hot water at a temperature of about 190°F.

Samples and information will also be available of the new metallised Pliofilm, suitable for many applications.

Powder Packaging Machine

For fully automatic packaging of powdered and granular products into flat sachet-type packages, **Hassia-Verpackungsmaschinen GmbH**, Raustadt, Oerhessen, West Germany, have introduced the BM II machine. The packs are formed from heat-sealing wrapping materials, filled, sealed and cut off by the machine. All parts in contact with the product being filled are of stainless steel. A hopper-vibratory or volumetric feed system is used and a stabiliser is fitted to prevent variations in filling weight. Filling quantities are: (a) dosing vibrator, up to 25-30 gm.; (b) volumetric feed, up to 100 gm.; and (c) Auger feed, up to 100 gm. Outputs are (a) 30-60 packs/minute, (b) 60-85 packs/minute and (c) Duplex 80-130 packs/minute, and (c) 25-40 packs/minute.

Metal-P.V.C. Laminate

Laminate, the new metal-p.v.c. laminate, introduced by **Huntley, Boorne and Stevens Ltd.**, Reading, Berks, will be shown for the first time. The bond is available in a range of colours, grains and printed effects on tinplate, aluminium, magnesium alloy, etc. Composite thickness ranges from 0.014 in. Also to be featured are internally coated cans which show good resistance to many chemicals, including alcohol, most acids and alkalis, hydrocarbons, petrol and paraffin. The laminate will withstand temperatures up to 110°C.

Automatic Bag Opener

To be shown by **Ideal Packagings Ltd.**, 1 Shrewsbury Road, London, N.W.10, will be a wide range of packaging machinery. Their high-speed automatic rotary heat sealer for polythene, Pliofilm, etc., is claimed to weld each minute 450 in. of tubes and bags of any width and height. The Fawema-Agma Division will show an automatic bag opening machine for the opening of block bottom, side fold or flat (pouch)

bags and for the automatic transfer of the erected, opened bags under a volumetric filler. The Aeratom Division will show a range of aerosol equipment.

Drum Coating Techniques

In addition to their range of finishes for metal packaging, **Robert Ingham Clark and Co.**, 4 Carlton Gardens, London S.W.1, will illustrate a new process—the continuous coating of metal strip. These coatings can be applied without handling between the stages of uncoiling, degreasing, pretreatment, coating, baking and recoiling. Also to be shown are special lacquers for drum interiors that are said to be suitable for 80% acetic acid, 20% brine, cationic amines, detergents, fertilisers.

Sack Closing Machinery

New developments in bag closing machinery made by the **Union Special Machine Co.**, Chicago, and shown by **Thomas C. Keay Ltd.**, P.O. Box 30, Baltic Street, Dundee, include closing heads which can operate at far greater speeds than previously. One of interest to the chemical industry is a closing head that provides a tape bound closure over the mouth of the sack; a pre-glued tape is fed over the line of stitching to give a sealproof closure. Seaming and tape sealing of single ply or multiwall paper bags is carried out in one operation.

Polythene-Polyester Film

Among new developments to be shown by **Kemitype Ltd.**, 8 Chase Road, Park Royal, London N.W.10, on the Chambon Group stand, will be a new polythene-coated polyester film made by **Kalle and Co.**, Wiesbaden-Biebrich, under the trade name Hostaphan/P.E. Two other films are an improved water-soluble polyvinyl alcohol film and a combination of polythene film laminated on urethane foam of varying thicknesses. The latter is of value for tank and vat lining and for sound and vibration insulation. The range of Ziegler polythene films has been increased by a pre-stretched transparent low-pressure film of considerably increased tear resistance.

One-piece Aerosol Cans

A range of aluminium aerosol cans from $\frac{1}{4}$ to 20 lb. oz. capacity, to be shown by **London Aluminium (Containers) Ltd.** on the stand of the Midland Aerosol Group, Dominion Works, Great Brickkiln Street, Wolverhampton, will include for the first time seamless one-piece aerosol packs and condenser cans.

Metal Containers' Display

New developments to be exhibited by **Metal Containers Ltd.**, Waterloo Place, Pall Mall, London S.W.1, include space saving liquid and open top containers. New products include fibre containers and Valthene polythene containers as well as new developments in container closures.

Saran-coated Paper

New developments of the **Metal Box Co. Ltd.**, 37 Baker Street, London W.1,

will include Saran-coated paper, which gives an exceptionally good moisture barrier, and heat laminated foil and polythene said to give a significant reduction in odour level. Poly-tainers and other plastics mouldings in some of the newer materials, such as high density polythene and polypropylene will be shown—these polymers will, it is said, allow products not previously packaged in plastics to be successfully handled.

'Easy-Clean' P.V.A. Adhesives

Recent developments in adhesives technology will be featured in the range of vegetable and synthetic adhesives produced by **National Adhesives Ltd.**, Slough, Bucks. These will include impact and pressure-sensitive grades, and synthetic remoistening and film laminating adhesives. For treatment of films by extrusion of polythene or Saran resins special primers are available to ensure a firm, durable coating. New developments exclusive to National include their range of Easy-clean p.v.a. adhesives, which ensure that machines are running full time—not standing idle while lengthy cleaning schedules are carried out.

P.V.C.-lined Fibreboard Drums

New to the range of containers provided by **Plastic Weldings Ltd.**, 11B Stratford Road, London W.3, are Mer-Vi drums. These are of fibreboard (Merton board) with circular Vitherm (p.v.c.) liners for carriage of liquids.

Polyamide Film

Polythene bags having a new type of powder-proof and watertight seal are produced by **Robert Peters (London) Ltd.**, 39 Hertford Street, London W.1. A new film deemed of interest to the chemical industry is polyamide film—it will withstand high temperatures, is sterilisable and chemically resistant.

'Armadillo' Drum

New development in drums is the Armadillo drum, a T.S. (taper-sided) light-gauge tinplate drum that saves space. It is manufactured by **Reads Ltd.**, Orrell House, Orrell Lane, Liverpool 9. Also new are a strap closure for open-ended drums and a nesting drum that can be stored, when empty, with maximum space utilisation. Reads have a new laboratory which offers service to customers, such as microbiological inspection, storage tests in incubation rooms and other tests that might be required.

Flameproof Filling Machine

Designed for operation in Group II petroleum or acetone vapours is the flameproof dial scale filling machine, developed by **Roberts' Patent Filling Machine Co. Ltd.**, Deane Road, Bolton, Lancs. This machine has a specially designed pressure-type filling valve, anti-hydrostatic provision and submerged filling. It is pneumatically operated and can be fitted if required with automatic feeding arrangements.

Stainless Steel Mixer

The Manesty 300 stainless steel mixer will be shown for the first time by **Manesty Machines Ltd.**, Speke, Liverpool 19. A larger machine than the



Manesty's new Rotapress rotary tablet machine can produce 6,000 tablets per minute

Manesty H Mixer, the new model has a larger capacity container for either wet or dry processing. Improved stainless steel cased seals on the paddle drive shafts ensure efficient sealing and prevent contamination and leakage of the material being processed. This mixer can handle between 300 and 400 lb., according to the density of the material being mixed.

Speedry 'Magic Marker'

A new marking system is to be exhibited by **Speedry Products Ltd.**, 83 Copers Cope Road, Beckenham, Kent. Known as the Magic Marker, it marks wood, metal, plastics, foil, material and all other surfaces including painted ones. It can be used out of doors without risk of fading when exposed to rain, frost, etc. It is available in black and a choice of vivid fadeless colours.

Automatic Vibrator Weigher

A new automatic vibrator weigher suitable for powders and granular material will be shown by **Southall and Smith Ltd.**, Villa Street Works, Hockley, Birmingham 19. It has a weight range from $\frac{1}{2}$ oz. to 1 lb. Also on show was the Southall and Smith rotary check-weigher which operates at a speed of 55/60 per minute and weighs to an accuracy of 1 grain (1/437 of an ounce). Heavy or light items are rejected into separate streams.

Cleaning, Filling and Closing Machine

Suitable for small and large glass and plastics bottles is the Type RFK combined cleaning, filling and closing machine of **H. Strunk and Co.**, Cologne-Ehrenfeld (represented by **Guest Industrials Ltd.**, 81 Gracechurch Street, London E.C.3). The machine cleans by blowing out liquid, then dries and inserts dropper tops, etc. Machines can be built in several sizes to take 2,000 or up to 25,000 articles an hour.

Telcothene Coated Papers

Prominence will be given to Telcothene coated papers, boards, foils and laminates by **Telegraph Construction and**

Maintenance Co., Mercury House, Theobald's Road, London W.C.1. Telcothene is polythene processed by Telcon and forms a moisture-proof and chemically-resistant barrier. Especially suitable for use under rigorous tropical conditions are Telcothene-bonded metal foil laminates.

Solvent-applied Vinyl

New development in the protective coating of cartons to be seen on the stand of **John Waddington Ltd.**, Wakefield Road, Leeds 10, is plastics coating by solvent-applied vinyl which provides excellent resistance to penetration by grease. Non-toxic, odourless and tasteless, this coating may be glued by various types of adhesives formulated in the company's laboratories.

Anti-corrosion Paper

On show for the first time by **Spicers Ltd.**, 19 New Bridge Street, London E.C.4, will be newly developed pressure-sensitive anti-corrosion paper, which can be used for the protection of metals.

Glass Resin Bonded Paper

Latest Sisalkraft product, produced by **Sisalkraft Division, J. H. Sankey and Son Ltd.**, Ripple Road, Barking, is Seekure. This is a resin-bonded, non-staining, glass-reinforced waterproof paper that is stated to offer a maximum waterproofness with high strength. It will not stain products or materials.

Russell's Mobile Elevator

For rapid handling of bulk materials there is a Russell mobile elevator made by **Russell Constructions Ltd.**, Russell House, 8-9 Adam Street, London W.C.2. The feed hopper has a capacity of 4 $\frac{1}{2}$ cu. ft. and as the feeding height is only 18 in. above ground level, little physical effort is required to load it. It can also be used for mixing two different materials



Russell's mobile elevator

while they are being elevated. The materials can be mixed and elevated in any proportions by altering the pitch of the screws of the spiral feeds. The unit is mounted on trolley wheels.

Also on show will be the Russell Invicta 36 in. screen sieving machine which employs the principle of gyratory turbulence. It can process powder at rates up to 10 tons per hour and liquids at rates of 20,000 g.p.h.

B.R. Ease Rules for Transport of Chemicals in Resil Packs

BRITISH RAILWAYS have agreed to modify their regulations for a wide range of chemicals to permit their carriage by passenger train in glass bottles when packed in Resil. Previously some of these chemicals were only acceptable for carriage by goods train and some were not acceptable at all, unless carried in special trucks. The latter category included petrol and organic peroxides.

The shipping companies' regulations have also been amended so far as this form of packaging is concerned. They will waive the clause that states that goods packed in cardboard boxes are acceptable only if classified as 'insufficiently packed'. This clause is waived provided shipping documents are marked 'Resil packed.'

The International Air Transport Authority has approved a special double Resil pack for the transit of high flash-point liquids. The moulded material will absorb the fluid in the unlikely event of the bottle being broken, the double volume of material acting as a guarantee of total absorption.

The Resil moulded unit of packaging was previously available only in limited quantities. The manufacturers, Resil Processes Ltd., whose sole sales concession-

aires are the Pontefract Box Co. Ltd., Pontefract, Yorks, have now completed new production facilities that allow for an extended distribution.

The units usually consist of two sections or blocks of the Resil homogenous and resilient cushioning material, moulded from waste wood shavings and paper reshaped on the inside surfaces to conform closely to the exterior contours of the article to be packed. Exterior surfaces are rectangular and when inserted in a strong, close-fitting cardboard container, provide a rigid pack for transit and storage. The Resil fibrous pulp is said to have excellent qualities of deceleration, shock absorption and resilience. It is completely inert and keeps out extremes of heat and cold. The units can be dust-proofed by applying either a special non-corrosive binder or a rubber latex base or a p.v.c.-based coating.

For chemical products in bottles, the pack takes the weight on the shoulders of the bottle to relieve the fragile neck. 90 oz. Winchesters are packed with the same ease as a 20 oz. bottle, which has a separate cavity for a 2 oz. polythene bottle moulded in the corner of the pack unit pack.

New Leak-proof Drum Tap in Polythene

A DRIP-PROOF and reversible drum tap which can be used with virtually any liquid, including paraffin, trichlorethylene, turpentine and others that are difficult to handle, is now being marketed by Phillips Telescopic Taps Ltd., Colliery Road, West Bromwich, Staffs.

The new tap, moulded in high density polythene (Rigidex) is tough and resistant to a wide range of liquids. It is



The Kerotite reversible drum tap moulded in h.d. Rigidex by Phillips Telescopic Taps, is shown being reversed into a 5 gall. drum for transit

claimed to be proof against drip and seepage even with paraffin and thus eliminates losses during storage. There are no internal washers or glands to deteriorate and manipulation is by push button, giving immediate on-off action.

New Morphine-like Analgesic Available from Huffer and Smith

FIRST trial quantities of a new synthetic analgesic—Phenazocine, also called N.I.H. 7519, and which is chemically (\pm) 2'-hydroxy 5:9-dimethyl-2-phenethyl-6:7-benzomorphan have been produced in this country by Huffer and Smith Ltd., fine chemical division of C. F. Gerhardt Ltd. The compound is described as a promising morphine-like analgesic first prepared by Dr. E. L. May and Dr. N. D. Eddy, at the National Institutes of Health, Bethesda, Maryland, U.S.

Work on the group of morphine-like analgesics was begun in 1955. First details on the preparation of N.I.H. 7519 were published this year in the *Journal of Organic Chemistry* (1959, 24, 294). Production involves a highly complex synthesis of some six to eight steps, and involves a starting material which has not hitherto been commercially available. Huffer and Smith Ltd. are at present engaged in working out a suitable commercial process and providing material for clinical testing in the U.K. by interested pharmaceutical houses.

Dosage of this benzomorphan is stated to be smaller than present morphine-like analgesics. Hence it should prove easier to cut down on dosage in cases of addiction. Results of preliminary clinical trials in the U.S. have been reported in *Anaesthesiology* (1959, 30, 355) by J. G. Eckenhoff and by Drs. A. E. Fraser and

H. Isbell in the minutes of 20th meeting of the Committee of Drug Addiction and Narcotics (1959, Addendum No. 3).

The Narcotics Commission of the United Nations has recommended to member Governments that they place this drug under provisional control as a narcotic. Pending a decision as regards this country Huffer and Smith Ltd., New Era Works, Purley Way, Croydon, will investigate the production process and supply material for clinical trial.

More Finishers to Use Proban's Immacula Finish

Proban Ltd., 1 Knightsbridge Green, London S.W.1, announce that a further three finishers have signed agreements for the use of the Immacula durable crease finish for wool. This new finish is applied by the cloth finisher. Only at the final pressing of the garment—when the tailor will use the technique prescribed—is the latent chemical change giving crease retention brought about.

£1 m. Contract for John Thompson

Manufacture and erection of all the steam-raising plant for a new 60 mW power station at Matà, Barcelona, is being carried out by John Thompson Water Tube Boilers Co., at a cost of about £1 million. Water treatment plant and feed dosing equipment is being supplied by John Thompson-Kennicott Co.

Cambridge Fire Holds Up University Research

RESEARCH work of fair national importance has been set back by a fire which burnt out a laboratory and two small supervision rooms in the corrosion section at the University of Cambridge Department of Metallurgy. A lecture room on the floor below was also severely damaged.

The fire broke out at 4.15 a.m. on Monday. In putting out the fire some 500,000 gallons of water were used which caused further damage throughout the building, including books in the department's library.

Principal assistant in the department, Mr. F. Bridgeman told *CHEMICAL AGE* that the fire apparently started in one of the small rooms. Fortunately the fire made a hole in the roof of the building which acted as a chimney and localised the fire. Cause of the fire is not yet known but the possibility of an electrical wiring fault is being examined.

Government and industry sponsored research described as of fair national importance was being carried out in the department. Work will now have to be suspended for some time, although it is hoped to put some of the people engaged on research in other parts of the building.

CAMBRIDGE POLAROGRAPHY CONGRESS

Polarographic Studies on Titanium Sulphate and Thiocyanate Complexes

IN sulphate medium three steps have been obtained during the reduction of the titanil ion at the dropping mercury electrode, reports Dr. G. M. Habashy, Polarographic Institute, Czechoslovak Academy of Sciences, Prague. Below 4M H_2SO_4 , the first two steps appear, the reduction is attributed to TiO^{++} and $[Ti(OH)(SO_4)]^+$, the positive wave is kinetic in nature and its height increases as the acidity increases until it reaches the total diffusion current.

At a rather high content of H_2SO_4 and SO_4^{--} the wave splits into two due to the reduction of a new complex species, probably $[Ti(OH)_2SO_4]^{++}$. The height of this new wave was also found to be dependent on the acidity of the solution and a simultaneous shift towards positive potential occurs, finally a single reversible wave is obtained at 10M H_2SO_4 .

The anodic oxidation of Ti^{+++} in similar media forms only one anodic irreversible wave. The irreversibility is also lessened by increasing the acidity.

Thiocyanate medium: Two polarographic waves are obtained. The positive one is kinetically controlled; its height was found to depend on the concentration of CNS^- ion. The complex has been found to contain one CNS^- group. The acidity has practically no influence on the height of the kinetic wave, but nevertheless there is an appreciable shift in the half-wave potential of the complex which lowers its overvoltage.

Ti^{+++} shows also complexation in thiocyanate medium, an anodic irreversible wave is obtained almost independent of the concentration of CNS^- ion.

Oscillographic studies in sulphate and thiocyanate medium as well as an $(i-t)$ curve have been recorded. The results obtained are in agreement with the polarographic results.

Polarographic Behaviour of α -Lipoic Acid

α -Lipoic acid and its amide, in the pH range between 1.8 and 12, show a single polarographic wave whose height is proportional to the concentration, stated Dr. S. E. Boeri, E. Fornasari and E. Vianello, University of Padua. The wave is diffusion controlled and the half-wave potential is displaced, to more negative values, by 55 mV per pH unit.

Controlled potential reduction of α -lipoic acid has been studied as well as the polarography of its reduction product and its oscillographic behaviour by the single-sweep method. Analysis of the results permits a description of the reduction mechanism they report.



Left to right: Dr. R. Kalvoda and Dr. J. Kuta (Polarographic Institute, Czech Academy of Sciences, Prague), Mr. M. J. Toogood and Mr. J. T. Yardley (Hopkins and Williams) and Mr. A. J. Hill (British Drug Houses)

Polarographic Analyses Based on Extraction with Organic Solvents

INSUFFICIENT specificity and tolerance to presence of different constituents, especially those present in high concentration is very often shown by the polarographic method of analysis. The first step in the case of the coincidence of polarographic waves is to change the polarographic characteristic of constituents in the solution, by altering their valency or type of complexes. If this fails, preliminary separations must be undertaken, before polarographic electrolysis state Z. P. Zagórski and Mrs. M. Cyrankowska, Central Laboratory for Accumulators and Primary Cells, Poznan.

Preliminary Separations

Methods of preliminary separations based on distribution between two liquid phases are very effective in connection with polarography, because the extraction characteristics differ much in comparison with polarographic ones. Batch extraction methods (shaking or continuous procedures) are preferred when it is necessary to separate constituents present in very different concentrations, e.g., in trace analysis problems. In most cases the constituent to be determined is extracted into the nonaqueous phase.

Application of two unit processes, e.g., of extractive separation and polarographic determination, for analytical purposes may be accomplished in three ways: (a) destruction of the organic constituents in the extract and polarographic analysis of the residue; (b) re-extraction of constituent desired into the aqueous solution to be polarographed; (c) direct polarographic examination of nonaqueous solution.

The detailed procedures employed in some newly developed methods belong to groups (a) and (b). Examples of group (a) are: Determination of traces of Ti in the presence of Fe, Pb and Cd in great excess (continuation ether extraction); determination of Cu and Pb in the presence of Fe and Cd in great excess (dimethyldithiocarbamate extraction into CCl_4); determination of Sn in the presence

of Pb in excess (cupferron extraction into $CHCl_3$, or continuous ether extraction in the presence of NH_4SCN).

Examples of group (b) are: Determination of Zn in the presence of Ni in excess (dithizone extraction, re-extraction with HCl solution), determination of Bi in the presence of Pb and Sn in excess (cupferron extraction into $CHCl_3$, re-extraction with H_2SO_4 solution).

Coal Structure Study Using Polarography

Coals are sufficiently homogeneous for solvent extracts of them to be similar in basic structure to the whole coal. Polarograms of these solvent extracts in dimethylformamide, report Dr. P. H. Given and M. E. Peover, B.C.U.R.A., Leatherhead, show two or three poorly defined waves superimposed on a sharply rising diffusion current.

In the region 0 to about -1.2 V (vs. mercury pool anode) the current is due to the reduction of quinonoid or other strongly conjugated carbonyl groups, and from about -1 V to -2.2 V to reduction of aromatic systems. The content of carbonyl groups has been estimated coulometrically and also from the uptake of C^{14} labelled acetyl groups by the electrolytically reduced materials.

Electron resonance measurements show that a fair proportion of the aromatic systems are reduced at -2.1 V to free radical ions, indicating the presence of aromatic systems having very negative half-wave potentials (e.g., naphthalenediphenyl).

The behaviour of solvent extracts of coals resembles that of naphthalene, diphenyl, etc., in another respect: in the presence of phenol as proton donor much larger diffusion currents are observed in the region -1.8 to -2.1 V. Analysis of material reduced at a controlled potential of -2.1 V shows that hydrogen uptake is considerably increased if phenol is present during the electrolysis and that some removal of oxygen-containing groups occurs.



Left to right: Prof. Paul Delahay (Louisiana State University, U.S.), Prof. Dr. M. von Stackelberg (Bonn, W. Germany) and Dr. (Rev.) T. J. Lane (University of Notre Dame, U.S.)

SUBSTITUENTS IN ALIPHATIC AND HETEROCYCLIC SERIES

DR. PETR ZUMAN, Polarographic Institute, Czech Academy of Science, Prague, says that whereas in benzenoid series the correlations between the half-wave potentials and the Hammett total polar substituent constants σ are well established, only little attention has been paid to the aliphatic and aromatic heterocyclic substances. The Taft polar substituent constants σ^* or the Roberts and Moreland inductive substituent constants σ^1 can be used for correlations in the aliphatic series. Using these relations he showed that those halogen derivatives, which show a departure from the S_N2 mechanism in homogeneous reaction kinetics, are reduced polarographically by a different mechanism.

The same equations can be used for compounds, bearing alkyls or other substituents on a reducible heterocyclic ring, treated in this case as one functional group. Similarly, states Dr. Zuman, a reducible heterocyclic ring bound on a phenyl can be treated. The effect of substituents in the phenyl in *m*- or *p*-posi-

tion on the reduction of the heterocyclic ring can be correlated to the constants σ . Linear free energy relationships do not allow for the comparison of different reducible heterocyclic rings, substituted by the same substituent.

For reducible groups in the side-chain of the heterocyclic system, three types of reaction series can be distinguished: (1) for the substituent on the heterocyclic ring, total polar constants (σ_{het} or σ) express influence on the reducible group. (2) For the substituent in the side chain, polar constants σ^* are used. (3) For substances bearing on different heterocyclic rings the same reducible group, the equation

$E^1 = \rho^* \sigma^* + (E^1)_{\text{het}} - (E^1)_{\text{benz}}$ (where $\sigma^* = (E^1)_{\text{het}} - (E^1)_{\text{benz}}$) benzene was deduced. As standard substances, heterocyclic aldehydes were recommended. The reduction of polycyclic benzenoid and heterocyclic substances could be discussed on similar lines, as well as the quinoid compounds. More than 500 values of half-wave potentials fit these correlations, Dr. Zuman reports.

Polarography for Surface Measurement of Finely Divided Solids

A NEW method of surface determination of powders has been developed by Dr. Z. P. Zagórski, Central Laboratory for Accumulators and Primary Cells, Poznan, consisting in measurement of the speed of their dissolution under strictly defined conditions. Dissolution is followed by a continuous polarographic method at constant potential in a vessel of special construction. The dropping mercury electrode gives accurate results in spite of hard-working conditions (resulting from quick by-flowing suspension) owing to electronic-mechanical drop control with short drop time.

For particular powders suitable (corrosive) solvents of varied viscosity are prepared for the purpose of dissolving 20% of powder in a time of 3-15 min. The slope of the dissolution curve is a measure of the external surface of the powder. A detailed description of the surface determination method for lead oxide powder and general conditions of

surface determination in the case of other substances was given at the Congress.

Zagórski states that the method is suitable for numerous inorganic and organic solid substances within the sieve and sub-sieve range, if the products of dissolution are polarographically active. Adequate solvents of smaller or greater viscosity have to be selected to suit particular powders for the purpose of receiving a dissolution of 20% of powder within several minutes' time.

Determination of adsorption kinetics using this technique is also possible and has been investigated for some samples of Fullers earth.

Farnborough Display

Stainless heat-resisting seamless, welded and drawn steel tube in both straight and manipulated forms are among the products to be shown at the Farnborough air display, on stand 211, by the Talbot Stead Tube Co. Ltd.

Behaviour of Lead Under Ca-EDTA in Lead Poisoning

LEAD poisoning has been treated in recent years by calcium disodium ethylene diamine tetra-acetate (Ca-EDTA) acting as a chelating agent. The treatment is usually controlled by the determination of lead excreted in urine by the action of EDTA.

In accordance with the polarographic properties of EDTA-lead complexes, Dr. Jerzy Chmielowski and Dr. Zdzislaw Myslak, Clinical Department of the Institute of Industrial Medicine, Zabrze, Poland, have found that the presence of EDTA does not affect the polarographic determination of lead ions in an acid solution of pH about 1.

Sometimes residual currents prevented the determination of lead in urine by deformation of the polarographic wave, but it was found that interfering substances could be removed by passing urine, acidified to pH about 1, through a short column of cation-exchange resin (Wofatit P). In acid solution the interfering substances were removed by sorption on resin, while the lead ion concentration remained unchanged.

For the polarographic determination of concentrations higher than 0.5 μg lead ions per ml. with an accuracy of approximately $\pm 6.5\%$ this method proved satisfactory.

The method was found adequate for the analytical control of the treatment of lead poisoning with Ca-EDTA. It appears that the polarographic examination of the course of lead excretion in urine, due to Ca-EDTA action, may facilitate the evaluation of early or doubtful cases of lead poisoning.

Oscillopolarographic Behaviour of Insoluble Substances

Dr. Robert Kalvoda, Polarographic Institute, Czechoslovak Academy of Sciences, Prague, noted that in oscillopolarography with a.c. of the frequency of 50 c/s, as in classical polarography, some insoluble substances dispersed in the supporting electrolyte yield on contact with the electrode incisions of various shape on the $dE/dt = f(E)$ curve. Some substances give incisions in the 'first' curve (single cycle) at the same potential as in the dissolved or ionised state (elementary sulphur—dissolved sulphur—sulphide; thallium (I) iodidethallos ion), some yield incisions only in the 'second' and next curves (multicycle) (Bi_2O_3 , CuO). Several substances show in a certain potential range a greater number of irregular incisions resembling disturbances in the curve. This effect characterising the majority of insoluble substances (HgO , Hg_2Br_2 , Hg_2Cl_2), has been observed also with the streaming electrode. In accordance with polarographic experiments these incisions can be explained by assuming a direct reduction. It was found that reducibility of the substances depends on some factors, e.g., on the ionic radius of the cation in the lattice of the insoluble substance.

Automatic Safety Equipment for Chemical Plant—2

Alarm Indicators & Annunciators

THE presentation (and identification) of an abnormal plant condition is accomplished visually through a wide variety of signal lamp fittings. These range in size and aspect from Post Office type 'pea' lamps with a $\frac{1}{4}$ in. thick domed glass lens, to those with flat, frosted-glass windows, 2 in. square. Indicator lamps are identified by labelling or integral wording or numbering. The practice of incorporating coloured lamps in a mimic diagram of the plant provides ready identification by position, and of function by colour.

Annunciator Systems. These systems comprise visual and audible means of capturing the operator's attention and identifying the cause and source of the abnormality. Provision is made for the operator to acknowledge the warning before action is taken to restore conditions to normal. Any number of signals may operate a common horn or bell and utilise a common 'acknowledgement' push-button. This silences the horn whilst the lamp, previously flashing, glows steady until the alarm condition has been corrected. The 'return to normal' condition may be accompanied by audible signal and acknowledged by cancellation again. Such a 'ring-back' system calls attention to both off-normal and return-to-normal occurrences and permits the operator to log exact time of interval of off-normal conditions. The Panalarm system, Fig. 4, marketed in the U.K. by Panellit Ltd., is a highly developed series of plug-in components, various combinations of which produce alarm systems applicable to any process plant. The object of this design and construction is to give flexibility and provide for future extensions.

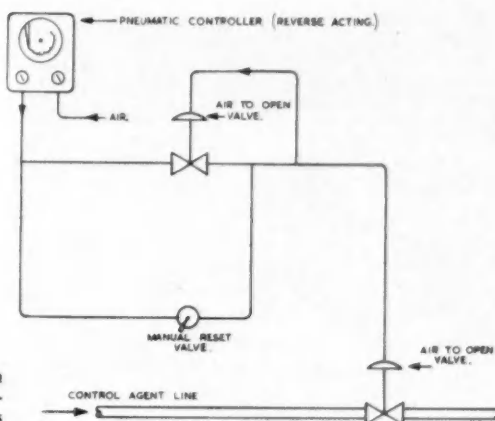
G.E.C. Litealarm

The G.E.C. Litealarm, Fig. 5, has been developed for oil refineries or for installation in hazardous atmospheres. The design is based on U.S. practice for this class of apparatus but conforms to B.S.S. 229, Group II and III, and is also certified for methane (Group I). Flashing and reset facilities are provided. All mechanisms and lamps are mounted on a removable panel to facilitate replacement by spares.

Testing Alarm Systems. The responsibility assumed by an alarm or shut-down system makes dependability the first essential and provision is usually made for frequent testing (at will) by the plant operator. A test 'signal' is placed on the system, usually by short-circuiting the initiating switch. A minimum check is through a 'lamp test' push button, and in some systems lamps are continuously monitored. Another method is for the alarm lamp to receive partial voltage; to glow dimly under normal

By
**L. S. James,
Constructors John
Brown Ltd.**

Fig. 6.—Pneumatic alarm system for use when electricity would be hazardous



conditions and brightly under alarm conditions.

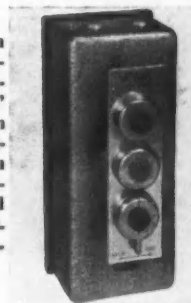
Alarm Contacts. The fitting of alarm contacts on small ammeters and voltmeters presents a special problem as it is essential to keep electrical loading on the contacts to a minimum. Automatic tripping usually entails the use of an auxiliary relay to close the trip circuit. The introduction of an amplifier is an advantage since the contacts can be of lighter construction and any tendency to bounce can be eliminated by introducing a capacitance delay in the amplifier circuit.

Pneumatic Shut-down Systems. Fig. 6 shows an automatic system for use in locations where the use of electricity is hazardous. When the recorder pen (or indicator pointer) reaches the set point, the output air pressure from the instrument decreases. The controlled valve closes and a small diaphragm valve in the air line from the instrument also closes. With the diaphragm connection of this valve on the downstream side of the valve, both valves will remain closed even though the pen on the instrument returns to a position below the set point. However, the valves can be re-opened by manual operation of the reset valve which would be of the self-closing type.

A good example of an automatic shut-down system exists on the gas reforming plant at the Romford Works of the North Thames Gas Board. The plant is

fed by refinery gas from the near-by oil refinery at Shell Haven and the process is continuous and cyclic. The four phases of heating, make purge, reforming and blow purge, occupy 4.83 minutes duration and the handling of steam, air blast, feed stock, air and gas to burners

Fig. 5.—Litealarm flameproof, panel-mounting unit. Below the 'high' and 'low' alarm lamps is the audible cancellation button, incorporating a reset and test switch. Courtesy, General Electric Co. Ltd.



and waste gases is typical of a process of this kind. While there is no final operational control by the instruments themselves, the complete automatic operation of valves and the automatic control of safe operation allows of minimum labour in operating the plant. The system of audible and visual alarms and safety shutdown devices is designed to come into operation under any of the following circumstances:

Incorrect operation of the plant valves;

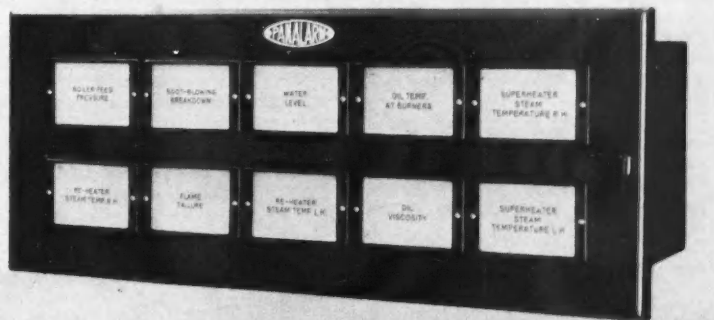


Fig. 4.—Panalarm annunciator system is self contained; plug-in units include relay units for each alarm point, common flasher unit and ring-back unit. Courtesy, Panellit Ltd.



Fig. 7.—Control desk for high-speed automatic alarm logging. The chart is divided into 32 columns corresponding to the various alarm points. Coincidental alarms are printed immediately with the time of occurrence; discrimination is possible to within one-tenth of a second. Courtesy Evershed and Vignoles Ltd.

blast failure; power failure; hydraulic failure; incoming gas supply failure; flame failure at the primary burner; high and low relief holder; water failure to scrubbers; rupturing of the bursting disc.

The last mentioned is set to rupture at 10 p.s.i. in the event of failure of the relief valve which is set to release to relief holder at 9 lb. per sq. in. The bursting disc exhausts to atmosphere 40 ft. above ground and away from plant and buildings.

High Speed Automatic Alarm Logging. Fig. 7 illustrates one of two alarm loggers built by Evershed and Vignoles Ltd. for the petrochemicals industry. The centre section contains a potentiometric temperature indicator to the left of which is a 72-point selector key board. The 32-point logger is housed in the rear right-hand side of the desk, the initiating circuits are intrinsically safe due to explosion hazard, the connections between the control room and the plant being via telephone type cables.

The chart is divided into columns corresponding to the various alarm points. Each point is monitored continuously and, as a number of alarms occurring together are printed immediately, the need for storage does not

arise. The time of an alarm occurrence is printed simultaneously in the chart margin, and the chart, normally stationary, commences to move. The chart moves for a preset period, and successive alarms occurring during this period are printed whilst the chart is in motion. Movement of the chart continues for one second after receipt of the last alarm and examination of the occurrence times and the relative positions of the alarm points, gives a detailed picture of the plant upset. It is possible to discriminate between alarms occurring in rapid succession to within one-tenth of a second.

This equipment is used with a conventional alarm annunciator by which the operator takes corrective action. It was designed to meet a special application although, with the increasing complexity of process plant, it fills a definite need. A portable model for temporary connection during the commissioning of complex plant, would appear to be an attractive development for the future.

The author acknowledges, with thanks, the co-operation of the following firms which supplied data and illustrations: Associated Fire Alarms Ltd., Evershed & Vignoles Ltd., General Electric Co. Ltd., Graviner Co. Ltd., K.D.G. Instruments Ltd., Londex Ltd., Minerva Detector Co. Ltd., Panellit Ltd.

Draft B.S. for Chemicals and Equipment

DRAFT standards circulated for comment (within one month) by the British Standards Institution include:

CZ 8225. Low compression set butadiene/acrylonitrile vulcanised rubber compounds.

CZ 8507. Density-composition tables for aqueous solutions of sodium chloride and of calcium chloride (revision of B.S. 823).

CZ 8552. Density hydrometers and specific gravity hydrometers (revision of B.S. 718).

CZ 8528. Method of determination of calorific value of liquid fuel by means of a bomb calorimeter.

CZ 8589. Methods for the analysis of copper alloys. Part 6. Tin (nickel coil reduction method).

CZ 8590. Methods for the analysis of copper alloys, Part 7. Silicone (photometric method).

CZ 8591. Methods for the analysis of

copper alloys. Part 8. Phosphorus (photometric method).

CZ 8740. Methods for the analysis and testing of coal and coke Part 10. Arsenic in coal and coke.

CZ 8763. Microchemical apparatus. Micro-nitrometer (Pregl type) (revision of B.S. 1428 Part D3).

Work has started on a standard for austenitic steel pipes and tubes for pressure purposes.

Temporary Exemption Order for Part I Chemicals

The Treasury has made the Import Duties (Temporary Exemptions) (No. 8) Order, 1959, which provides that the chemicals listed in Part I of the schedule shall be temporarily exempted until 1 October 1959 from import duty chargeable under the Import Duties Act, 1958. The order has been published as Statutory Instrument, 1959, No. 1530.

Box-Type Mixer-Settler Uses Polythene

ONE of the first complex pieces of process equipment made almost entirely of polythene is a box-type, mixer-settler extractor—developed by Iowa State College, Ames, Iowa, U.S. It was designed to handle corrosive chemicals used in the separation of materials by liquid-liquid extraction.

The equipment is composed of a horizontal contactor in the form of a rectangular box about nine inches high. The box is divided into sections, each of which handles a stage in the extraction process. Each section contains a mixing chamber suspended in an antechamber, and a settling chamber. Underflow and overflow ports connect the sections, for flow from stage to stage. The box—and the partitions separating the sections and the settling and antechambers within the sections—are made of polythene sheets. Each side of the box is one piece, as is the entire bottom. After assembly of box and partitions, all joints are reinforced and made weather-tight by welding with molten polythene.

Mixing chambers are made from polythene cups, and polythene tubes welded to these cups act as inlets and outlets. Each mixing chamber contains a uni-peller assembly, consisting of saran-mounting plate, stainless steel bearing, polythene coated stainless steel shaft and a polythene impeller.

U.K. President for Fertiliser Conference

THE International Superphosphate Manufacturers' Association will hold its biennial technical conference in Stockholm from 14 to 18 September. One hundred and forty delegates from 20 countries will take part. Sixteen papers will be presented, dealing with simple and complete (N-P-K) fertilisers, sulphuric and phosphoric acids, from the standpoint of production techniques: analysis of plant food content; and factory management. Delegates will be able to exchange views in informal discussion groups on three current problems—the incorporation of urea in N-P-K fertilisers, economical methods of roasting pyrites, and the extraction of the troublesome fluorine content of phosphate rock.

Dr. B. Raistrick (U.K.), chairman of the I.S.M.A. Technical Committee, will preside over the conference.

Scottish Diatomite Stop Production in Skye

Diatomite production in Skye has been temporarily stopped by Scottish Diatomite Ltd., the only company in this field in Scotland, to allow redevelopment of plant and techniques. Mr. J. Boyd, managing director, has indicated that the decision is a result of economic factors. The plant installed has been producing at about half capacity; reopening is anticipated only after a new plant has been installed which will provide the capacity and continuity necessary to allow economic operation.

Overseas News

SWISS CHEMICAL INDUSTRY REPORTS HIGHER OUTPUT AND EXPORTS

SWISS chemical industry is now showing a full recovery and output is stated to be increasing month by month.

About 90% of the industry's products are sold abroad. The latest official returns show that exports in the first seven months of this year increased in value by nearly S.Frs.120 million compared with the corresponding period of 1958, from S.Frs. 642.1 million (£52.6 million) to S. Frs. 760.7 million (£62.3 million).

Increased foreign sales are reported by all branches of the industry including dyestuffs which had been most affected by the recession. Although sales figures will not be available until the end of the year, it is believed that sales of Ciba A.G. will greatly exceed the S.Frs.1,000 million mark—an increase of 100% over the figure in 1949 and that Sandoz A.G., whose world turnover last year passed the S. Frs. 500 million for the first time, will show a substantial rise.

Chief market for Swiss chemicals is Europe with the six Common Market countries as the main outlets.

West German Nitrogen Fertiliser Consumption

Nitrogen fertiliser consumption in West Germany in the year ended 30 June 1959 reached the record figure of 570,000 tonnes nitrogen. Nitrogenous lime also reached the consumption record of 98,000 tonnes nitrogen. Sales of salt-petre fell.

\$50 Million Petrochemical Project for Colombia

A petrochemical plant is to be erected in the Barranca Bermaja oilfields of Colombia at a cost of some \$50 million. It will be built and operated by International Petroleum Colombia Ltda. Plans for the plant have been laid before the Colombian National Planning Committee for the Ministry for Mines.

U.S.S.R. to Reconstruct Chemical Plants

Plans to reconstruct, extend and re-tool more than 200 industrial enterprises in the Moscow region, one of the U.S.S.R.'s main industrial centres are reported. According to estimates, a radical reconstruction of present undertakings will cost 5,000 million roubles less than the construction of new plants.

When the projected reconstruction has taken place, the Voskresensk Chemical Works, for example, will double its phosphate fertilisers output. This will be achieved without any increase in its labour force, by modernising equipment and improving technology.

Genrikh Zelenko, chairman of the re-

cently-formed State Committee for Vocational and Technical Training under the U.S.S.R. Council of Ministers, stated in *Pravda* that he believes that the number of skilled workers being trained for enterprises in the chemical industry should be increased to at least 20,000 or 25,000 by 1965, as against the present figure of between 3,000 and 3,500.

C.I.L. Double Capacity of Alberta Polythene Plant

Canadian Industries, Ltd., Montreal, have completed the doubling of the capacity of their Edmonton, Alberta, polythene plant to 40 million lb. annually. The programme also included the expansion of the product evaluation laboratory, doubling of the compounding facilities and the increasing of the warehouse space and machine shop facilities. Included in the new equipment is a special British gas turbine that uses natural gas from which the ethylene has been removed.

The Edmonton plant recently received a 2 million lb. order for specially formulated resins from a U.K. company for the trans-Atlantic telephone cable.

Brazil Has New Hydrogen Peroxide Plant

Hydrogen peroxide is now being produced by Cia. Electroquímica de Osasco (Sampaio), Rua D. Veridiana, Sao Paulo, subsidiary of the Medicinalis group. The Osasco plant represents an investment of U.S. \$732,000 in imported machinery and Cr. \$70 million locally. The only other producer of hydrogen peroxide in Brazil is Industria Química Mantiquera S.A., who have a plant at Lorena.

Polyamide Fibre Production in Hungary

Production of polyamide fibres has begun at the Nyersujfalu plant in Hungary with equipment supplied from East Germany. Capacity of the polyamide plant is 350 tonnes at present; it is later to be extended to 1,000 tonnes.

60 Million lb./Year Carbon Black Plant for Italy

The Columbian Carbon Co. has begun the construction in Italy of a £2 million plant with production facilities for over 60 million lb. of carbon black annually. The plant, which will operate under the name of Columbian Carbon Europa, is being built near Milan, and is expected to be in full operation early in 1961. Most of the materials for the new plant's construction will come from Italy and other Common Market nations. The plant it-

self is being constructed by Italian companies to designs of Columbian engineers.

Three grades of carbon will be produced in the new plant: two tread blacks used by tyre manufacturers to increase wear of a tread, and a carcass black which gives a tyre much of its body flexibility.

Italy has no carbon black production of its own, and in 1958 relied upon the U.S. for 29,498,508 lb., of which 12,788,158 lb. consisted of types that Columbian Carbon Europa will make in Italy. The quantity shipped from the U.K. to Italy last year was 4,751,508 lb.

Jordan Stepping Up Phosphate Production

Jordan Phosphate Mines Co. Ltd. have sent delegates to countries importing phosphates to conclude agreements for the guaranteed disposal of the 1959 production, which they hope will be 450,000 tons.

Production in 1958 was 293,832 tons, of which 241,189 tons was exported.

Monsanto Chemical's Expansion Plans for Maleic Anhydride

Expansion plans for maleic anhydride have been confirmed by Monsanto Chemical, U.S. The 20 million lb.-per-year expansion is scheduled to start in the third quarter of 1960. The company have also reduced the price of maleic anhydride by about 18%. New price, effective from 1 January 1960, will be 22.5 cents per lb. (tank car loads).

Vice-president Robert M. Morris reports that important manufacturing economies are anticipated from the proposed additional capacity, which, if realised, could result in a still lower price for the product. Of the total U.S. capacity of 66 million lb., Monsanto now have 40 million lb.

Fertiliser Plant for El Salvador

Manager of the Institute for the Development of National Production in El Salvador has recently announced that a nitrogen and phosphate fertiliser plant is to be established as it had become obvious that fertilisers, rather than greater mechanisation, were needed to improve the coffee and cotton crops. It is expected that U.S., Japanese, German, Italian and French firms will submit tenders. Value of imports of these fertilisers was about U.S. \$5½ million in 1957.

Yugoslavia Producing High- Quality Phenol

Yugoslav and West German engineers have built a plant at the Katran factory in Zagreb, Yugoslavia, for the production of high-quality phenol.

Further U.S. Credit for Chilean Nitrate Developments

Washington Export-Import Bank has agreed to increase the \$16 million credit granted in 1956 to the Anglo-Lautaro Nitrate Corporation by another \$4 million in order to promote that company's programme for the expansion of nitrates production and particularly nitrate by-products, through additional

purchases of U.S. machinery and equipment.

Second stage of this programme, for which the additional credit is needed, will consist of construction of mechanised loading facilities at the port of Tocapilla; construction of plants for the production of iodine, boric acid, and salt cake; construction of additional solar evaporation ponds; and the purchase of five diesel-electric generating units.

Maleic Anhydride Plant for California Chemical Co.

Plans for construction of a plant for the manufacture of maleic anhydride have been announced by California Chemical Co., California, a subsidiary of Standard Oil Co. The unit will have a capacity of 20 million lb. annually. It will be built at Standard's refinery at Richmond, California, and is scheduled for completion by mid-1960. (See also *CHEMICAL AGE*, 8 August, p. 107, for news of other U.S. maleic anhydride plants.)

Glaxo's Malayan Plant

The \$2.2 million plant that Glaxo Laboratories Ltd. are building at Petaling Jaya, Kuala Lumpur, is nearing completion and should start initial operations in about two months. Production range will include antibiotics and specialised pharmaceuticals.

U.S. Plastics Production Estimates

Production estimates for U.S. plastics, based on the first few months of this year, suggest that the total for the year will be about 5,600 million lb., a 22% increase over the 1958 total of 4,600 million lb. Leading plastics production is polythene, both high and low pressure types; these could reach 1,150 million lb. this year, it is estimated, against the 865 million lb. last year. Second in production is likely to be vinyls and vinyl copolymers, at 1,100 million lb. compared with 869 million lb. last year. Also rapidly gaining ground are styrene and polyesters.

Fertiliser Processing Plant in Southern Rhodesia

Compound mixtures and phosphates previously imported from Holland are now being manufactured at a £150,000 granulation plant of the Windmill Fertiliser Co. at Salisbury, Southern Rhodesia. The factory can produce high-analysis fertiliser at about 20 tons an hour.

Sulphur from Refinery Waste Gas

The Chinese Petroleum Corporation have succeeded in extracting sulphur from the waste gas produced in refining petroleum in Formosa. They are producing 7 metric tons of sulphur a day and have installed a plant for manufacturing sulphuric acid.

P.V.C. for Magnets

Plastics magnets are now being produced by the B. F. Goodrich Co., U.S. Materials used in their manufacture are p.v.c. and, as a magnetic substance,

barium ferrite. The magnets made from these materials are said to be more durable than purely metallic types. They are designed for use mainly as door-magnets, particularly for refrigerators.

Spain Increasing Fertiliser Production

A fertiliser factory at Puertollano will come into operation shortly with a production of 100,000 tons a year. Spain's total fertiliser production in 1958 was 300,000 tons, which a spokesman of the National Institute of Industry said would be raised to 800,000 tons within four years.

West German Stagnation in Sulphuric Acid Production

In the first half of this year West German production capacities for organic and inorganic industrial chemicals were used to the full. The production index for organics (1938: 100) reached 310 by the end of the half-year as against 284 at the start of 1959, this spurt is explained mainly by the growing petrochemical industry. Partly as a result of the stagnation of German sulphuric acid output, the index for inorganics rose by only three points over the half-year to reach 227.

West German sulphuric acid production for the half-year was barely above that for the first half of 1958 at 1,153,000

tonnes. A satisfactory development, however, was reported in the fields of soda, output of which rose by 6.4% to 464,300 tonnes, chlorine, output of which increased by 8.8% to 284,900 tonnes, caustic soda, up by over 8% to 334,900 tonnes and calcium carbide, up by 7.7% to 515,200 tonnes.

Germans Plan Fibre Plant in Indonesia

According to the leader of an Indonesian Government delegation at present visiting West Germany, Ismael Thajeb, German experts have been engaged in studying the prospects for the building of a synthetic fibre plant in Indonesia. Indonesia, he said, was also very interested in the possibility of West German participation in plastics production.

Polish Chemical Production

Statistics of chemical production in Poland for the first half of this year include: sulphuric acid, 299,100 tons; nitrate fertiliser, 130,500 tons; phosphate fertiliser, 82,800 tons; and cellulose, 125,900 tons.

Quotas for sulphuric acid, caustic soda and chemical fertilisers were all over-fulfilled, but those for phenol and caprolactam were not achieved, although phenol production doubled in the first five months of the year.

Du Pont's New Fluorocarbon Resin

NEW fluorocarbon plastics material, Teflon FEP (fluorinated ethylene propylene), is believed by the manufacturers, E. I. du Pont de Nemours and Co. Inc., as likely to spread the unique benefits of the fluorocarbon plastics to a broader spectrum of industry than ever before.

Direct descendant of Teflon TFE (tetrafluoroethylene) fluorocarbon resin, Teflon FEP has almost all the properties of the former. It has good melt-flow properties, it can be moulded and extruded like nylon, polythene and other resins. In appearance the new resin resembles high-density polythene; it has excellent transparency in thin sections and is a translucent white in greater thickness. FEP, however, cannot be exposed continuously to a temperature of 500°F as can TFE, but only to a temperature of about 400°F.

Other qualities shared by TFE and FEP are as follows. They are excellent electrical insulators, with a little of the resin going a long way, thus saving space and weight. They have no known solvents and are unaffected by most chemicals. Exceptions are alkali metals and certain halogenated compounds at high temperatures.

Three-quarters of the market for FEP is expected to be in wire and wire products and the remainder will go into injection-moulded parts, tubing, and a variety of other end uses. FEP is stated to provide a wire and cable coating resin that is easily pigmented and to give a high quality, chemical-resistant jacket in long continuous lengths, free of flaws and capable of continuous service at

400°F. It also shows no evidence of turning brittle after prolonged heat ageing. As a primary insulation, FEP can be extruded successfully over tin-plated, aluminium-plated, silver-plated or bare copper conductors.

Ice does not stick to FEP and there are thus possibilities that the resin could be used, for example, on airplane leading edges and propeller blades to prevent ice build-up.

Teflon FEP is already being sold in the U.S. as a film ranging from 1/32 in. to 30 in. thickness, maximum roll width 16 in. Because it is a thermoplastic, the film can be heat-sealed to itself in a wrapping operation for very thin primary insulation, can be combined with TFE and other materials or used as a cable overwrap. In printed wiring boards a film of FEP serves as the filling in a sandwich of copper foil and TFE or TFE-coated glass fabric. Capacity dielectrics are another promising application.

A variety of plastics moulds might be vacuum- or heat-formed from FEP film. The film will also be used, it is predicted, in gaskets, seals, diaphragms and bearings, because of antistick and corrosion-resistance properties, heat sealability, heat bondability, and freedom from pin holes.

Other suggestions are as corrosion-protective lining for tanks and piping.

Du Pont's will sell Teflon FEP as a granular powder at an initial commercial price of about \$12 per lb. It will also be marketed as a film and thin-walled tubing with tentative plans to supply laminations of FEP. Under study are market applications for FEP-coated fabrics.

Commercial News

F. W. Berk and Co.

Results of F. W. Berk and Co. indicate that the year's profits will be higher, said Mr. A. D. Berk, chairman. The interim is to be raised from 2 11/12% to 3 1/4%, an increase that does not imply a larger final dividend.

Lawes Chemical Co.

Group profit for Lawes Chemical Co. Ltd. for the year ended 30 June was £91,690 (£128,819), tax took £38,215 and net balance was £59,758 (£60,451). Dividend is maintained at 14%. A one-for-four scrip issue is proposed.

The report states that the 1958-59 season was affected by poor autumn demand due to exceptionally wet weather during this period and development expenses necessary for the expansion of business.

Borax (Holdings)

Group trading profits of Borax (Holdings) for the three months to 30 June, after heavier depreciation charges, totalled £1,147,116, an increase of £555,000 over the corresponding period of the previous year. Trading balance for the nine months to 30 June was £2,744,749, a rise of £1.57 million compared with the 1957-58 period.

After all charges, including tax £341,558 (£206,378) and outside interests £231,951 (£125,743), the balance attributable to the company increased from £210,654 to £527,353 for the June quarter. For the nine months the net figure is up from £396,326 to £1,283,689.

Demand for boron products has remained active during the June quarter and the potash season in the U.S., which ended 30 June, proved to be better than the previous year. Higher tonnages were sold, although at lower prices. Prices for the new fertiliser year just commencing show no improvement.

British Titan Products

Group trading profits of British Titan Products Co., show a marked increase for 1958. They total £4,127,431 (£3,589,440). After depreciation of £1,245,406 (£1,021,766), special depreciation of £550,000 (nil); tax of £864,914 (£1,189,907), etc., net profit is £1,312,198 (£1,199,002).

Murex Ltd.

Trading surplus for Murex Ltd. for the year ended 30 April 1959, before taxation, amounted to £620,430, which is 13% below that for 1957-58. Group net profits were £334,034 compared with £291,650 and the dividend is cut 2 1/2% to 15%.

Authorised group capital expenditure rose from £280,000 to £690,000. This was due to the decision to spend some £400,000 on extensions to Murex Welding Processes Ltd., a wholly owned

- Berk Report Good Half-year, Raise Interim
- B.T.P. Group Profits Up by £538,000
- B.A.S.F. Issue to Finance Building Plans
- Edrolchemie's First Year Loss of £434,000

Murex subsidiary, over the next two years.

Improvement in demand has been noted in the opening months of the current year.

United Glass

An interim dividend of 3 1/4% is to be paid by United Glass on capital increased by a one-for-five scrip issue. The 1958 interim was equivalent to 3 1/4%.

Powell Duffryn

Group trading profit of Powell Duffryn Ltd. for the year ended 31 March was £1,513,188 (£1,831,634). Tax took £644,670 (£596,046) and group net profit was £1,075,560 (£1,213,663). Final dividend of 10% is proposed, making 16%.

B.A.S.F.

The board of Badische Anilin- und Soda-Fabrik AG, of Ludwigshafen-on-Rhine have announced that they are to recommend the raising of the company's capital from DM.612 million (about £51 million) to DM.700 million (about £58.34 million) at a meeting to be held on 25 September. The new capital is for the erection of new plant and for the modernisation and extension of existing installations.

E.N.I. of Italy

The State E.N.I. natural gas and mineral oil company in Italy announce that net profit for the year ended 30

April totalled 4,600 million lire (£2.64 million) as against 4,800 million lire (£2.75 million). Gross revenue rose from 9,790 million lire (£5.62 million) in 1957-58 to 13,380 million lire (£7.69 million) in 1958-59. Natural gas production of the subsidiary AGIP Mineraria rose by 3% (in the previous year by 12.7%) to 4,820 million cubic metres and mineral oil output by as much as 59% (including liquefied natural gas) to 345,400 tonnes.

At the E.N.I. Ravenna plant ethylene production began towards the end of the financial year. The Sominer subsidiary continues its search for uranium in Italy.

BP Benzin und Petroleum

The West German company B.P. Benzin und Petroleum AG, a 100% subsidiary of British Petroleum and one of the parent companies of the Erdölchemie GmbH, announce a trading loss for 1958 of DM.8,420,000 (some £702,000) compared with a loss of DM.2,710,000 (some £234,200). Erdölchemie GmbH, the B.P.-Farbenfabriken Bayer petrochemical concern which started production last year, suffered a loss for 1958 of DM.5,200,000 (£434,000).

INCREASE OF CAPITAL

YOUNGHUSBAND STEPHENS AND CO. LTD. Chemical manufacturers, etc. Lower King and Queen Wharf, Rotherhithe, London S.E.16. Increased by £99,900, beyond the registered capital of £100.

Market Reports

HOME TRADE CONTINUES ACTIVE

LONDON Home trading conditions have been fairly active with the main consuming industries calling for good deliveries against contracts. There has been additional enquiry for the routine soda products and a reasonably steady trade is reported from most sections. A good flow of export inquiry for chemicals and allied materials continues with Australia and India the chief outlets.

Prices generally are little changed and the undertone is firm. Fluctuations in the price of zinc are reflected in the quotations for zinc oxide, the current price for the red seal grade being £99 per ton.

Among the coal tar products there has been a steady demand on home and export account for both cresylic acid and creosote oil, while available supplies of naphthalene are finding a ready outlet.

MANCHESTER Trade in heavy chemical products has been reasonably steady. With few exceptions the lead-

ing industrial outlets has been specifying for steady deliveries under contracts and rather less interference with the movement of supplies due to holiday conditions has been reported. Enquiries on shipment account have been on a fair scale. Except for a few slight fluctuations prices are well held. Buying interest in fertilisers has been rather more in evidence, but so far it has been confined to the compounds and one or two other sections.

SCOTLAND Quite a brisk position has prevailed during the past week in most sections of the Scottish heavy chemical market. Demands against spot requirements have been fully maintained, while those pertaining to contract requirements have also been well taken up. The range of chemicals has been varied, with quantities well up to normal requirements. Prices generally have shown little change. There is now a seasonable quietness in agricultural chemicals, although some activity can be reported. The export market is still reasonably active.

● **Dr. Robert Cockburn** has been appointed Chief Scientist of the Ministry of Supply in succession to Sir Owen Wansbrough-Jones, who is resigning from the Civil Service on September 30, to join the board of Albright and Wilson Ltd. Dr. Cockburn has been Controller of Guided Weapons and Electronics in the Ministry since October 1956.

● **Mr. Brian Whitear, A.R.I.C.**, a research chemist since 1954 with Ilford Ltd., has been awarded the Perkin Centenary Fellowship, tenable from 1 October in the Chemistry Department, Southampton University. Under Professor R. C. Cookson he will study a problem related to the photochemical reactions of coloured substances.

● **Mr. W. E. K. Piercy**, a director of Albright and Wilson Ltd., is to take part in a three-day course on the theme of 'The Six and the Seven' to be held at St. Ermin's Hotel, London S.W.1, on 28, 29 and 30 October. He will serve on a panel that is to consider discussion group reports on the effect of raw materials imports on the Common Market area and on the 'outer seven'.

● **Mr. H. F. Wilson, B.Sc., A.R.I.C., F.P.I.**, who has been elected president of the Plastics Institute for 1959-60, is assistant managing director, Cables Division, Telegraph Construction and Maintenance Co. Ltd. Other officers elected are: chairman, **Dr. G. Tolley, M.Sc., Ph.D., F.R.I.C.**, director of research, Allied Ironfounders Ltd.; vice-chairman, **L. M. Read, A.R.C.S., A.M.I.Chem.E.**, British Resin Products Ltd.; Barry; hon. treasurer, **A. W. Sherwood, F.P.I.**, Bakelite Ltd.; hon. general secretary, **J. Taylor, B.Sc., F.R.I.C., F.P.I.**, consultant; new ordinary members of council, **M. G. Church, B.Sc., Ph.D., A.R.I.C., F.P.I.**, Ministry of Supply; **J. Hargreaves, I.C.I.**, Midlands Office; **D. S. Mahon, B.Sc.**, Bakelite Ltd.; **P. Russell, B.Sc., A.R.I.C.**, B.I.P. Chemicals Ltd. **C. R. Todd, F.P.I.**, has been co-opted to the council in place of **A. O. R. Johnson, T. H. and J. Daniels Ltd.**

● **Mr. S. P. Chambers**, a deputy chairman and chairman-designate of Imperial Chemical Industries Ltd., will as president of the Combustion Engineering Association, preside at a conference to be held at Scarborough on 3 and 4 November on the 'Automatic boiler house.' Opening address will be given by **Mr. B. E. A. Vigers**, a deputy chairman of Laporte Industries Ltd., and **Mr. R. H. E. Thomas**, National Coal Board member for marketing and supplies.

● Fellowships for postgraduate research training have been awarded by the British Oxygen Group as follows: **Mr. J. P. Catchpole, B.Sc.**, for research training in the Chemical Engineering Department, Birmingham University; **Mr. N. R. Grey, B.A.**, and **Mr. M. R. Jones, B.A.**, in the Inorganic Chemistry Laboratory, Oxford

PEOPLE in the news

University; and **Mr. R. M. Thorogood, B.Sc.**, at Imperial College, London. Fellowship held by **Mr. R. D. Johnston, B.Sc.**, at Battersea Polytechnic, has been renewed for a third year.

● **Professor H. Mark**, director of the Polymer Research Institute of Brooklyn, New York, is to deliver the 4th Backeland memorial lecture under the title 'Recent progress in polymer chemistry'. The lecture will be given at an open meeting to be held on 22 October at 6.30 p.m. at the Royal Institution, Albermarle Street, London W.1.

● **Mr. B. E. A. Vigers, M.A.(Cantab.), M.I.Chem.E., M.Inst.F.**, has relinquished the position of assistant managing director of Laporte Industries Ltd., Hanover House, Hanover Square, London W.1, and has been appointed a deputy chairman of the company and technical director of the Laporte Group. He joined Laporte in 1935. Earlier this

B. E. A. Vigers, who has become a deputy chairman of Laporte Industries



year he was appointed to the newly formed Ministry of Power Committee on Coal Derivatives. Mr. Vigers also serves on the Chemical Engineering Research and Advisory Services Committee and the Fuel Efficiency and Allied Services Committee of the Association of British Chemical Manufacturers and the Fuel and Power Consumers' Policy Committee of the Federation of British Industries.

● Fellowships of the Plastics Institute have been awarded as follows: **J. B. Cameron, B.Sc., A.R.I.C., A.P.I.**, chief chemist, Fairey Aviation Ltd.; Hayes; **L. N. Phillips, A.R.I.C., A.P.I.**, Royal Aircraft Establishment, Farnborough; and **Dr. S. N. Pinner, B.Sc., Ph.D.**,

F.R.I.C., head of the polymer research section, Tube Investment Research Laboratories, Cambridge.

● **Mr. Hector D. Walker**, sales director of Constructors John Brown Ltd., C.J.B. House, Eastbourne Terrace, London W.2, returned to London on 28 August from the Middle East. He left by air for Holland on 1 September.

● **Dr. Robert F. Hudson, Ph.D., B.Sc., A.R.C.S., D.I.C.**, lecturer in chemistry at Queen Mary College, London University, has been appointed a group director of research at Cyanamid's Research Institute, Geneva. He will take up his appointment early in 1960. **Dr. Volker Franzen**, Max Planck Institute for Medical Research, Heidelberg, has also been appointed to a similar post. Both scientists will pursue their investigations with a free hand, directing their work towards the uncovering of new scientific information rather than towards the development of specific commercial products. Dr. Hudson will study the mechanism of organic substitution reactions and other theoretical and physical chemical problems, and, like Dr. Franzen, will be assisted by

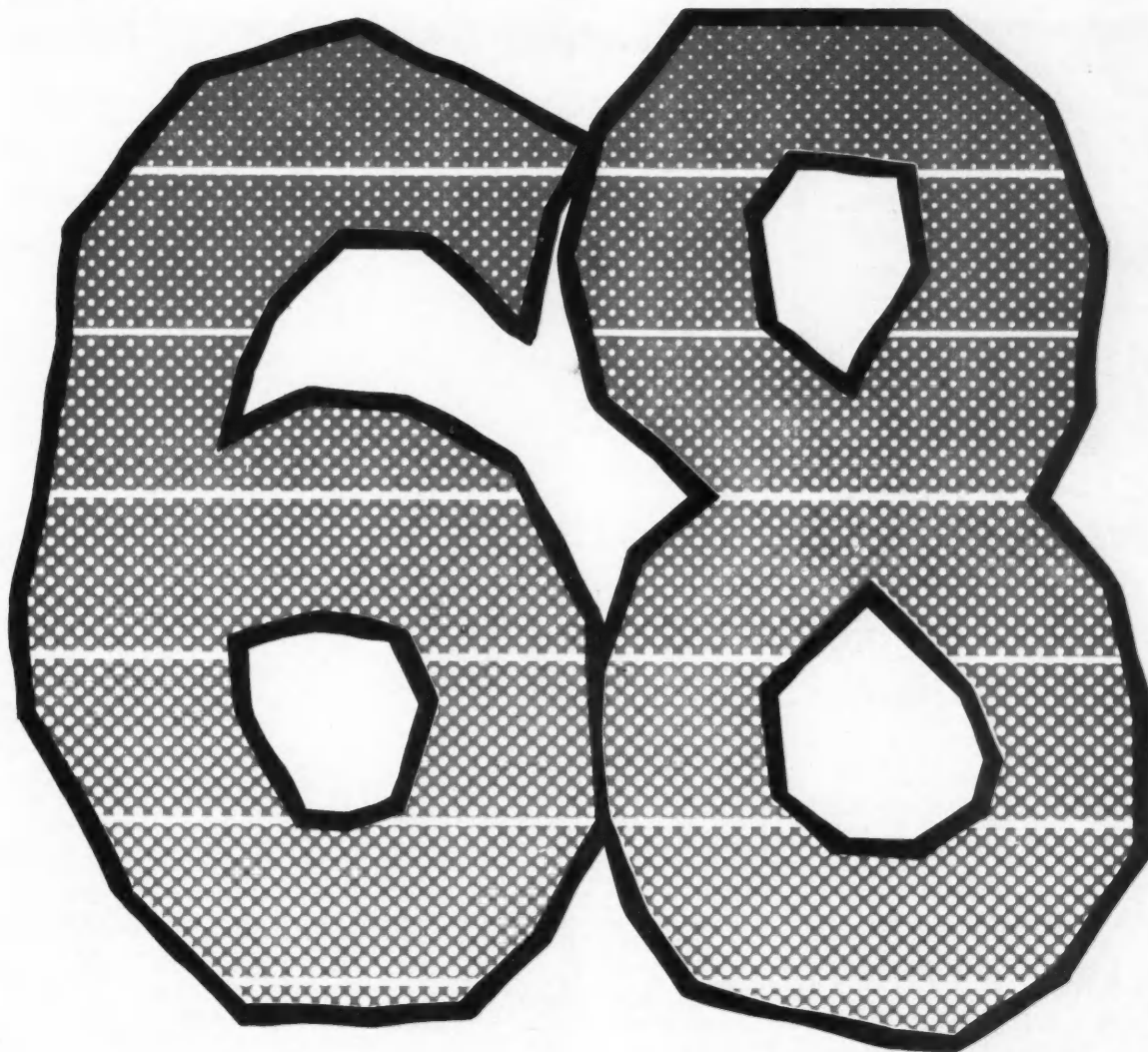


Dr. R. F. Hudson, a new group research director for Cyanamid in Geneva

several research scientists chosen for their knowledge in the field he selects for investigation. Recently Dr. Hudson has been engaged on research on organic sulphur and phosphorous compounds. Dr. Franzen will include in his initial programme research on high energy organic intermediates and on enzyme synthesis.

● **Mr. C. T. Saivin**, a technical officer of the Association of British Chemical Manufacturers, will be leaving in the near future to take up an appointment with British Hydrocarbon Chemicals Ltd., Devonshire House, Piccadilly, London W.1.

● **Sir Henry Jones** has been appointed chairman of the Gas Council in succession to **Sir Harold Smith** who retires on 31 December on completion of his term of appointment. Sir Harold became deputy chairman in 1948 and chairman in 1952. Sir Henry has been deputy chairman of the Council since 1952 and before that was chairman of the East Midlands Gas Board. **Mr. W. K. Hutchinson**, chairman of the South Eastern Gas Board since 1948, and president of the Institution of Chemical Engineers, has been appointed to succeed Sir Henry as deputy chairman of the Council.



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"Frightful Wastage" of Print Dispute—Benn Bros. Chairman

SIXTY-THIRD annual general meeting of Benn Brothers Ltd., proprietors of CHEMICAL AGE, was held on Friday, 28 August at Bouverie House, Fleet Street, London E.C.4. The following are extracts from the report of the chairman, Mr. E. G. Benn.

After several years of steady growth, the business of Benn Brothers, Limited, grew again, and more rapidly, during the 12 months ending 30 June last. It is disappointing to have to report that the speed of development slowed to a halt during the last few weeks of the financial year, and has since gone into reverse, because of another printing stoppage, the third since the war.

As publishers we were not directly involved in the dispute, except as spectators, watching with mounting anger the antics of the two sides, who began growling at each other in the public prints and on television as long ago as January with the inevitable result that each found itself in positions from which there could be no retreat without loss of face. A stoppage became inevitable. Eventually, an independent referee called the parties round a table to discuss like adults a settlement—a settlement that could and should have been achieved early in the year without the frightful wastage of the stoppage.

Selfish Policy

The printing industry of this country is, to a large extent, 'sheltered'. As an essential service it has been able, until recently, to recoup any increases in costs by passing them on to customers. Selfishly, it has sought to take full advantage of its strong position. This selfish policy is also shortsighted. The British trading community will not be held up to ransom and, being the most inventive and ingenious in the world, has already discovered ways and means, which will be used to an increasing extent, of doing without the traditional printer.

I have dealt with the printing stoppage at considerable length because of its importance. Benns are old-established publishers of trade and technical journals. In this progressive, challenging, New Elizabethan era, industry and commerce need these journals, providing as they do an essential intelligence service, more than ever. With or without the help of printers, we have continued, and I hope always will continue, to give that service.

That is our guiding principle. Shareholders at the annual general meeting may endorse or reject it. They should know that, taking the short view, the effect of it on the company's finances has been severe.

During the first eleven months of the financial year, your company did well. Then, in June, came the stoppage and a loss. The 'we-did-them-ourselves' journals continued our service to our subscribers, but they were not profitable. Even so the profit for eleven months, less the loss for one, resulted, as the accounts show, in a better final figure than a year

ago, £76,775 net profit, against £71,574 for 1957-58.

Your directors recommend a slightly reduced dividend on the Ordinary shares. From all that has already been said, the reason for this recommendation will be obvious. The company lost money in June, and further losses were incurred in July. Full particulars are not yet known; but it will be remembered that the stoppage of three years ago cost your company an estimated £23,000.

The new financial year, in a word, has begun badly, and to cushion the effects shareholders may agree that it is better to carry forward a larger amount.

Common prudence does not imply any lack of confidence. As already mentioned, the first eleven months were successful. In spite of the setback in June, the turnover for the full year comfortably passed the £1,000,000 mark for the first time. We may reasonably claim that all journals and directories enjoy the confidence of their readers and advertisers in full measure. With all the constituent parts in good shape, the undertaking as a whole faces the future with cautious optimism—cautious because it has yet to be seen whether income from readers and advertisers will increase sufficiently to meet the higher charges likely to be imposed by printers.

Partly to balance these factors are the growth and diversification of your business. Beginning with the January issue, another of the great old established trade journals of the world, *The Sales and Wants Advertiser*, joined the Benn Group.

Ever since he returned to publishing from Army service at the end of the war, Mr. Keon Hughes, deputy chairman and a managing director of Benn Brothers, has been an active member of the executive committee of the Furnishing Trades Benevolent Association. Just as the financial year was ending his colleagues learnt with the greatest pleasure that Mr. Hughes had been elected as national president of this great trade charity, to take office on 1 July.

Relationships in Industry

Sir Alexander Fleck, chairman of I.C.I., will open the Scottish conference on 'Relationships in Industry, some changing concepts of management,' that is being organised jointly by the British Institute of Management and the Ministry of Labour. It will be held at Gleneagles Hotel on 23 and 24 October. The object of the conference is to bring together top level Scottish industrialists to examine and discuss management responsibilities in relation to human problems in industry.

Zirconium Sponge Exemption

An application for the exemption from import duty of zirconium sponge (unwrought form of the metal) is being considered by the Board of Trade.

TRADE NOTES

B.I.P.'s New Offices

The London office of the British Industrial Plastics group is now at Haymarket House, 28 Haymarket, London S.W.1. The new offices house also the London sales offices of two subsidiaries, B.I.P. Chemicals and the Streetly Manufacturing Co.

Minican Temperature Recorder

The Cambridge Minican temperature recorder for use in restricted spaces to provide a continuous record of process temperatures, is described in a new leaflet by the Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London S.W.1.

Endurion Process

By arrangement with B.B. Chemical Co. Ltd., Leicester, the Metal Finishing Division of the Pyrene Co. Ltd., Brentford, Middx, is now marketing the Endurion process as an addition to their range of Parkerizing rustproofing finishes for the treatment of ferrous metals. The Endurion process is a simple immersion treatment used in conjunction with Parkerizing zinc phosphate systems. The coating produced can be waxed, oiled or painted or coloured by dyeing followed by waxing, oiling or lacquering.

Merger

Inspection Services Ltd., and R. F. Fraser-Smith, late of 69 Kings Cross Road, London W.C.1, have merged their interests.

Enquiries for non-destructive testing

equipment, including radioactive isotope containers, and a new portable magnetic crack detector weighing 45 lb., giving an output of 750 amps, with built in change-over switch, for operation on 100/120 or 200/250 volts a.c. single-phase supply, should now be addressed to: Inspection Services Ltd., Oldfields Trading Estate, Sutton By-Pass, Sutton, Surrey. Tel.: FAIrlands 4546/7/8.

Kodak Chemicals

All chemicals previously handled from Kodak Ltd.'s Kirby office, with the exception of Eastman organic chemicals are now sold from 1-4 Beechstreet, London E.C.1. This is a temporary address until the company moves into new offices on 16 September at Kingsway, London W.C.2.

Treforest Chemical Name Change

The Treforest Chemical Co. Ltd., Pontypridd, South Wales, an associate company of Chemicals and Feeds Ltd., Adelaide House, King William Street, London E.C.4, has changed its name to P. Leiner and Sons (Wales) Ltd.

I.C.I. and Marex Fans

Marston Excelsior Ltd., Wolverhampton, an I.C.I. subsidiary, have acquired from the Hudson Engineering Corporation, Houston, Texas, the sole right to manufacture Hudson hollow plastics industrial fans, in the U.K. The fans will be sold under the trade name Marex. Initially, the standard range

will consist of four-bladed fans ranging from 6 to 14 ft in diameter in increments of 2 ft in diameter. A set of hollow plastics blades may be fitted to two types of hub, either the auto-variable hub, which by means of a pneumatically activated diaphragm alters the angle of pitch while the fan is in motion, or the adjustable pitch hub, which requires that the fan be stopped while a simple manual alteration of pitch is carried out. On both hubs the angle of pitch may be varied between -15° and $+30^\circ$. Blades are made of woven glass cloth and pigmented epoxy resin, laminated as a one-piece moulding. These materials make a self-coloured blade, which is corrosion- and heat-resistant, while the method of construction gives blades of smooth surface, high strength, and low weight.

Geon P.V.C. and Hycar

A new data book describing their range of Geon p.v.c. materials and Hycar nitrile rubbers and latices has been published by British Geon Ltd., Devonshire House, Piccadilly, London W.1. The booklet covers Geon vinyl resins, latices and compounds as well as Hycar.

Monsanto Price Reductions

Following a substantial increase in the volume of sales and improved manufacturing costs, Monsanto Chemicals Ltd. are able to make reductions of up to 18% in the prices of crystal clear Polystyrene (polystyrene), 100 sheet in gauges of 0.003 in. to 0.020 in. An example of the reductions is that the basic cost of 0.0075 in. sheet is now as low as 24s 7d per 1,000 sq. in.

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 23 September

- Production of N-substituted 2-hydroxymethyl pyrrolidines. Beecham Research Laboratories Ltd. **820 503**
 Stabilisation of sulphur trioxide. Olin Mathieson Chemical Corp. **820 456**
 Production of lithium aluminium hydride. Imperial Chemical Industries Ltd. **820 513**
 Process of producing epoxides. Distillers Co. Ltd. **820 461**
 Production of cephalosporin by fermentation. Imperial Chemical Industries Ltd. **820 422**
 Antibiotic compositions containing antibiotic E.129 factors. Glaxo Laboratories Ltd. **820 658**
 Polymerisation of olefins. Sun Oil Co. **820 425**
 Method for making hardenable, basic silicon-containing condensation products. Chemische Fabrik Pfenner G.m.b.H. **820 529**
 Process for polymerisation of vinyl and vinylidene compounds. Farbenfabriken Bayer A.G. **820 675**
 Fungicidal compositions. Armour & Co. **820 596**
 Preparation of polycarbonates. Columbia-Southern Chemical Corp. **820 603**
 Recovery of cyclohexanol and cyclohexanone. Inventa A.G. **820 435**
 Process for the production of polyolefins. Ruhrchemie A.G. **820 773**
 Process for purifying acrylonitrile. Knapsack-Griesheim A.G. **820 692**
 Introduction of carboxyl groups into heterocyclic compounds. Henkel & Cie G.m.b.H. [Addition to 816 593.] **820 478**

Open to public inspection 21 October

- Process and apparatus for the separation of isotopes by fractional distillation. Brewer, A. K., and Madorsky, S. L. **822 001**
 Fertilisers of reduced corrosive effect. Scottish Agricultural Industries Ltd., Raistrick, B., Bookey, J. B., and Graham, R. **822 145**
 Unsaturated ureido ethers and polymers thereof. Rohm & Haas Co. [Addition to 747 184.] **822 266**
 Gasoline containing organic boron compounds. Standard Oil Co. **822 278**
 Manufacture of new aromatic compounds containing fluorinated side chains. Farbwerke Hoechst Aktiengesellschaft vorm Meister, Lucius, & Brünig. **822 009**
 Fertilisers. Scottish Agricultural Industries Ltd. **822 146**
 Direct-dyeing dyestuffs of the triazine series and process for their manufacture. Ciba Ltd. **822 013**
 Method of melting, or concentrating to a melt a solution of, urea and other organic compounds. Stamicarbon N.V. **822 149**

- Thermally stable bonded siliceous structures. Owens-Corning Fiberglass Corp. **822 261**
 Linear polyesters. Kodak Ltd. [Addition to 744 975 and 777 217.] **822 015**
 Gas filter media. Freudenberg Komm. Ges. auf Aktiengesellschaft, C. **822 175**
 Treatment of nuclear fuel. U.K. Atomic Energy Authority. **822 290**
 Substituted coumarins and the preparation thereof. Spofa Spojené Farmaceutické Závody Narodni Podnik. **822 181**
 Polymerisation of olefins or olefin-containing mixtures. Gelsenberg Benzol A.G. **822 033**
 Monomeric polymerisable ureido and thioureido compounds, methods for producing them and polymers thereof. Rohm & Haas Co. [Addition to 747 184.] **822 267**
 Quaternary salts and their production. Cilag Ltd. **822 351**
 Trichloromethylthio-derivatives of aromatic amines. Philips Gloeilampenfabrieken N.V. **822 237**
 Pyrolysis of hydrocarbons and apparatus thereof. Union Carbide Corp. **822 039**
 Di-(carboxyphenyl) alkanes and alkyl resins and processes for preparing same. American Cyanamid Corp. **822 188**
 Carbonylation process. Esso Research & Engineering Co. [Addition to 722 975.] **822 042**
 Process for the manufacture of diamond from graphite. Asscher's Diamantrijverheid N.V. **822 363**
 Securing ceramic materials to metals. Rolls-Royce Ltd., and British Oxygen Co. Ltd. **822 193**
 Dyestuffs containing a pyrimidine group and process for dyeing therewith. Imperial Chemical Industries Ltd. **822 047**
 Protective coating of articles of aluminium or alloys of aluminium. Coal Industry (Patents) Ltd. **822 366**
 Dryer composition. General Aniline & Film Corp. **822 365**
 Catalytic reforming of petroleum hydrocarbons. British Petroleum Co. Ltd., Moy, J. A. E., and Burbidge, B. W. [Cognate application 37465.] **822 197**
 Catalytic reforming of petroleum hydrocarbons. British Petroleum Co. Ltd., and Moy, J. A. E. **822 198**
 Preparation of alpha-phenoxalkanoic acids. Boots Pure Drug Co. Ltd. **822 199**
 Manufacture of chlorine dioxide. Solvay & Cie. **822 368**
 Analgesically active substituted α -d-phenyl- γ -amino-butyramides and manufacture thereof. Nederlandsche Combinatie voor Chemische Industrie N.V., and Laboratorie Pharmaceutica Dr. C. Janssen N.V. **822 055**
 Hardening gelatine. Gevaert Photo-Producten N.V. **822 061**
 Shampoo compositions containing the gamma isomer of benzene hexachloride. Imperial Chemical Industries Ltd., Blagg, G. L., Hudson, H. E., and Jones, W. G. M. **822 068**
 Plant-growth regulators comprising heterocyclic nitrogen compounds. Geigy A.G., J. R. **822 069**
 Methods of reducing the metal-corrosive properties of combustion gases. Central Electricity Generating Board, and Lees, B. **822 314**
 Production and recovery of D-arabitol. Commercial Solvents (Great Britain) Ltd. **822 153 & 822 154**
 Production of oestradiol. Laboratoires Francais de Chimiotherapie. **822 205**
 Articles of manufacture from linear high polymers of propylene and process for their preparation. Montecatini Soc. Generale per L'Industria Mineraria e Chimica. **822 080**
 Streptomycin and dihydrostreptomycin compounds. Lepetit S. p. A. **822 081**
 Method of removing lead borate sealing glasses. Corning Glass Works. **822 273**
 Sulphonyl-ureas and process for their manufacture. Farbwerke Hoechst A.G. [Addition to 808 072.] **822 090**

- Metallisable polyazo dyestuffs derived from hydroxy sulpho benzo quinolines and their use. Geigy A.G., J. R. **822 094**
 Alcoholysis of esters. Du Pont de Nemours & Co., E.I. **822 106**
 Processes and apparatus for the catalytic cracking of hydrocarbon oils. Baatasfische Petroleum Maatschappij N.V., DE. [Addition to 765 261.] **822 249**
 Diazepine derivatives and process for their preparation. Chemische Fabrik Promonta G.m.b.H. **822 215**
 Polychlorotetrahydrothiophene-1-oxides. Diamond Alkali Co. **822 115**
 Dimethyl-tertiary butyl acetyl indane. Firmenich, A., Firmenich, R., Firmenich, G., and Firmenich R. E. [trading as Firmenich et Cie.] **822 116**
 Steroids and the manufacture thereof. Upjohn Co. **822 118**
 Cyclic thiophosphoric acid ester amides, and the production thereof. Asta-Werke A.G. [Addition to 812 651.] **822 119**
 Process and plant for low-temperature cooling of a difficultly liquefiable gas. Sulzer Freres, S.A. **822 122**
 Fire-retarding additive. Chemische Werke Albert. **822 123**
 Stabilised multivitamin compositions containing vitamin B₁₂. Vitarine Co. Inc. **822 127**
 Process for aminating nitrogen-containing heterocyclic compounds. Grace & Co., W. R. **822 134**
 Process for concentrating sugar solutions. Inventa A.G. **822 137**
 Production of unsaturated carboxylic acids. Standard Oil Co. **822 140**
 Method for preparing acrylonitrile. Goodrich Co., B. F. **822 142**
 Process for production of anti-tumour substance ramycin. Sumiki, Y., and Umezawa, H. **822 226**
 Catalyst. Polymer Corp. **822 227**
 Organic boron compounds and liquid leaded motor fuel containing same. Standard Oil Co. [Divided out of 822 278.] **822 279**
 N-trisubstituted borazanes and fuel compositions containing them. Farbenfabriken Bayer A.G. **822 229**
 Organometallic complexes and their production. Du Pont de Nemours & Co., E.I. **822 091**
 Process for the production of filamentary materials from polyolefins. Soc. Rhodaceta. **822 230**
 Compounds for combating microorganisms. Philips' Gloeilampenfabrieken N.V. [Divided out of 822 237.] **822 238 & 822 239**
 Gasolene containing organic boron compounds. Standard Oil Co. [Divided out of 822 278.] **822 280**
 Thermally stable bonded siliceous structures. Owens-Corning Fiberglass Corp. [Divided out of 822 261.] **822 262**

AMENDED SPECIFICATIONS

On Sale 9 September

- Esters of 3, 5, 5-trimethyl-1-hexanol and to lubricating compositions. Du Pont de Nemours & Co., E.I. **635 656**

On Sale 14 October

- Neutral esters of dithiophosphoric acid. Farbenfabriken Bayer A.K. **748 299**
 Silicone rubbers. General Electric Co. **773 324**
 Rigid polymerised halide composition. General Tire & Rubber Co. **773 530**

Admiralty De-Salting Plant Contract for Boby's

An Admiralty contract for a complete electro-dialysis de-salting plant has been awarded to William Boby and Co. Ltd., Rickmansworth, Herts. The plant is for H.M.S. *Jufair* a shore base at Bahrain.



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CHELSEA COLLEGE OF SCIENCE AND TECHNOLOGY DEPARTMENT OF CHEMISTRY ANALYTICAL METHODS

A second series of postgraduate lectures on more recent analytical techniques will be held during the Autumn term on Tuesdays at 7.15 p.m., commencing on October 20, 1959. The topics will include mass spectrometry, non-aqueous solvents, activation analysis, complexometric titrations, EMR and microwave spectroscopy, ion exchange, X-ray fluorescence, and gas chromatography.

A leaflet giving full details, and an application form may be obtained from the Head of the Chemistry Department, Chelsea College of Science and Technology, Manresa Road, London, S.W.3.

SURREY COUNTY COUNCIL KINGSTON TECHNICAL COLLEGE

Post Graduate Lecture Courses during the Autumn Term, 1959

- Chemistry and Metallurgy of Rarer Metals**
A series of eight lectures, on Tuesday evenings at 7 p.m., commencing 20th October. The lecturers will include Dr. I. Jenkins, L. R. Williams, A. R. Powell, F.R.S., Dr. J. P. Cranston, T. L. Brown, K. J. Boaden, R. Titterton, D. A. Oliver.
- Newer Methods in Organic Chemistry**
A series of six lectures, on Thursday evenings at 7 p.m., commencing 29th October. The lecturer will be Dr. W. J. Hickinbottom.

Leaflets giving details and registration forms may be obtained from the Head of the Chemistry Department, Kingston Technical College, Fassett Road, Kingston-upon-Thames, Surrey.

PATENT AND TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a Queen Victoria Street, London, E.C.4. City 6161. Booklet on request.

PATENTS

The proprietor of British Patent No. 709848, entitled "NEBULIZER FOR ADMINISTERING MEDICAMENTS", offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

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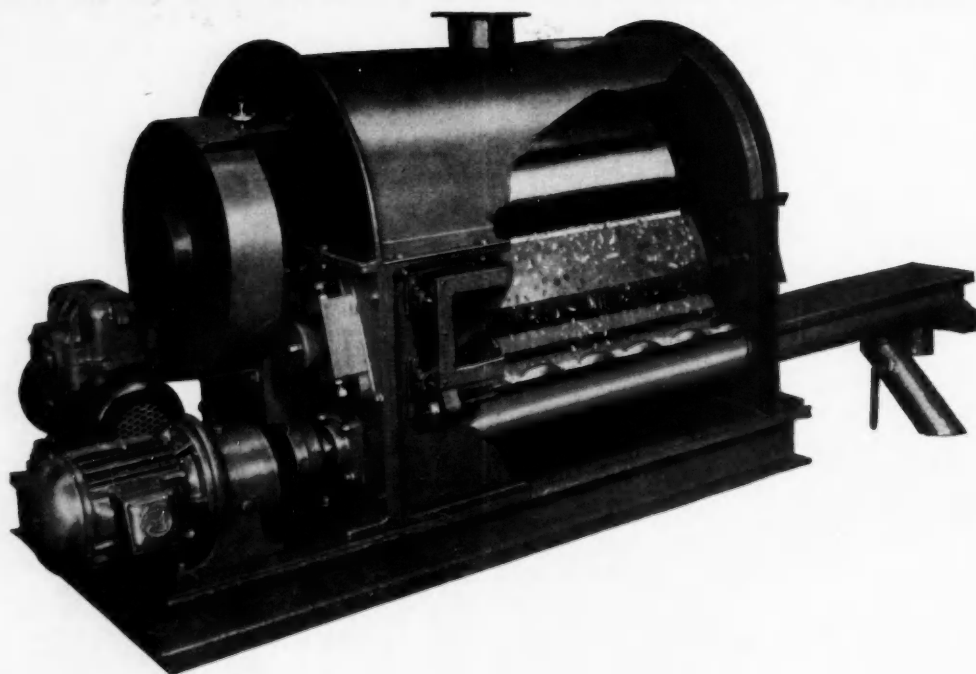
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